

FORM PTO-1390  
(REV 10/95)

U. S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

HUBR 1177

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/762006

INTERNATIONAL APPLICATION NO.

PCT/EP99/05710

INTERNATIONAL FILING DATE

6 August 1999

PRIORITY DATE CLAIMED

6 August 1998

TITLE OF INVENTION

NOVEL PHOSPHOLIPIDS WITH UNSATURATED ALKYL AND ACYL CHAINS

APPLICANT(S) FOR DO/EO/US

Hansjörg EIBL and Thomas HOTTKOWITZ

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is the **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
  2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
  3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(I).
  4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
  5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
    - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau.)
    - b. ☐ has been transmitted by the International Bureau.
    - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
  6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
  7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
    - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
    - b. ☐ have been transmitted by the International Bureau.
    - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
    - d. ☐ have not been made and will not be made.
  8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
  9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
  10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).
- Items 11. to 16. below concern document(s) or information included:
11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
  12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
  13. ☒ A **FIRST** preliminary amendment.
 

☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
  14. ☐ A substitute specification.
  15. ☐ A change of power of attorney and/or address letter.
  16. ☒ Other items or information: (a) International Search Report; (b) PCT/IPEA/409; PCT/IB/306/ PCT/RO/101
  17. ☒ The follow fees are submitted: (a) Check for Filing Fee and (b) Assignment Fee

EXPRESS MAIL NO. EL 759723714 US MAILED  
FEBRUARY 1, 2001

09/762006

JC07 Rec'd PCT/PTO 01 FEB 2001

## BASIC NATIONAL FEE (37 CFR 1.492(A)(1) - (5)):

Search Report has been prepared by the EPO or JPO ..... \$860.00

International preliminary examination fee paid to USPTO (37 CFR 1.482)  
..... \$690.00

No international preliminary examination fee paid to USPTO (37 CFR 1.482)  
but international search fee paid to USPTO (37 CFR 1.445(a)(2)) ... \$710.00

Neither International preliminary examination fee (37 CFR 1.482) nor  
international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$1000.00

International preliminary examination fee paid to USPTO (37 CFR 1.482)  
and all claims satisfied provisions of PCT Article 33(2)-(4) ..... \$100.00

## ENTER APPROPRIATE BASIC FEE AMOUNT =

\$860.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30  
months from the earliest claimed priority date (37 CFR 1.492(e)).

\$

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	34 - 20 =	14	x \$18.00	\$252.00
Independent	2 - 3 =	0	x \$80.00	\$
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$250.00	\$
TOTAL OF ABOVE CALCULATIONS =				\$1112.00

Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement  
must also be filed (Note 37 CFR 1.9, 1.27, 1.28).

\$ 556.00

## SUBTOTAL =

\$556.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30  
months from the earliest claimed priority date (37 CFR 1.492(f)).

\$

## TOTAL NATIONAL FEE =

\$556.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be  
accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property+

\$ 40.00

## TOTAL FEES ENCLOSED =

\$596.00

Amount to be:  
refunded

\$

charged

\$

- a. ☒ A check in the amount of \$ 596.00 (Filing Fee) and Assignment fee to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. 50-0624 in the amount of \$\_\_\_\_\_ to cover the above fees.  
A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit  
Account No. 50-0624. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a)  
or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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*James R. Crawford*  
NAME

02/01/01

39,155  
REGISTRATION NUMBER

EXPRESS MAIL NO. EL 759723714 US Mailed FEBRUARY 1, 2001

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JC07 Rec'd PCT/PTO

01 FEB 2001

HUBR 1177

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Eibl, et al.

International  
Appln. No. : PCT/EP99/05710

International  
Filing Date : August 6, 1999

For : NOVEL PHOSPHOLIPIDS WITH UNSATURATED ALKYL AND  
ACYL CHAINS

February 1, 2001

Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231  
Box PCT

**PRELIMINARY AMENDMENT**

SIR:

In advance of prosecution, please amend the above-identified patent application as follows:

**IN THE CLAIMS**

Cancel claims 31, 36-42 without prejudice.

Claim 10, lines 1-2, delete "any of the preceding claims" and substitute -- claim 1 -- .

Claim 11, line 1, delete "any of claims 1 to 9" and substitute -- claim 1 -- .

Claim 12, lines 1-2, delete "any of the preceding claims" and substitute -- claim 1 -- .

Claim 13, lines 1-2, delete "any of the preceding claims" and substitute -- claim 1 -- .

Claim 14, lines 1-2, delete "any of the preceding claims" and substitute -- claim 1 -- .

Claim 18, line 1, delete "any of claims 1 to 13" and substitute -- claim 1 -- .

Claim 20, line 1, delete “or 19”.

Claim 21, line 1, delete “or 19”.

Claim 22, line 1, delete “or 19”.

Claim 23, line 1, delete “any of claims 18 to 22” and substitute -- claim 18 -- .

Claim 24, line 1, delete “any of claims 18 to 22” and substitute -- claim 18 -- .

Claim 25, line 1, delete “ 19, 21 or 23”.

Claim 26, line 1, delete “19, 21 or 24”.

Claim 27, line 1, delete “or 19”.

Claim 28, line 1, delete “or 19”.

Claim 29, lines 4-5, delete “any of claims 1, 18 to 26” and substitute -- claim 1 -- .

Claim 32, line 1, delete “any of claims 29 to 31” and substitute -- claim 29 -- .

Claim 33, lines 2-3, delete “any of claims 1, 14 to 17 and 27 to 29” and substitute  
-- claim 1 -- .

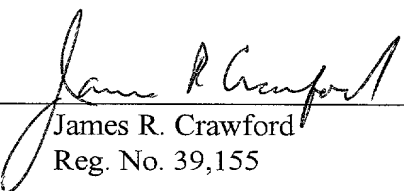
REMARKS

Please enter this amendment prior to examination on the merits.

It is not believed that any fees are due at this time, but any necessary fees may be charged to deposit account no. 50-0624.

Respectfully submitted,

FULBRIGHT & JAWORSKI L.L.P.

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## PHOSPHOLIPIDS WITH UNSATURATED ALKYL AND ACYL CHAINS

## Description

5 The invention relates to phospholipid-like compounds of the formula (I) with defined apolar constituents, and to a process for the preparation thereof. The invention additionally relates to the use of the phospholipid-like compounds as liposomes, active ingredients and  
10 solubilizers.

Phospholipid-type compounds have many possible uses, for example as liposome constituents for transporting drugs or as gene transport vehicles, as solubilizers  
15 for drugs of low solubility in water, and themselves as active ingredients against diseases such as, for example, cancer or leishmaniosis.

Phospholipid-like compounds of this type consist of a  
20 polar and an apolar moiety. Glycerophospholipids comprise as essential constituent glycerol which is esterified in the sn-1 and sn-2 positions mainly with fatty acids (apolar moiety). If at least one of the two OH groups on the glycerol structure is etherified with  
25 an alcohol, the term used is ether phospholipids. The polarity of the compounds of the invention derives from the negatively charged phosphate group and from the esterified alcohol component, which contains a quaternary, positively charged nitrogen. This group may  
30 be present one or more times or else not present at all, resulting in each case in a negative or positive excess charge or else no charge.

The apolar portion is formed by alkyl or acyl chains,  
35 which may be in saturated or unsaturated form. The possible variations in the synthesis of the apolar region has to date been limited to the naturally occurring acyl radicals or alkyl chains. It is possible

by specific modifications of the apolar region to change markedly and control specifically the physical, biochemical and biological properties of the phospholipid compounds.

5

Liposomes as transport vehicles or drug carriers are known. The frequently used phosphatidylcholines such as 1,2-dipalmitoyl-*sn*-glycero-3-phosphocholine (DPPC), 1,2-distearoyl-*sn*-glycero-3-phosphocholine (DSPC) or 10 1,2-dioleoyl-*sn*-glycero-3-phosphocholine (DOPC) form on sonication with cholesterol in the ratio 60:40 liposomes of the order of 60 nm in size. However, it may often be advantageous to produce liposomes with a larger internal volume, because larger amounts of 15 active ingredients can be transported therewith. However, the problem with this is that to produce liposomes with a diameter of more than 100 nm in size it is necessary to use processing techniques such as, for example, extrusion, which is associated with 20 distinct disadvantages, for example due to the brittleness of the polycarbonate membrane or blockage of the pores. This makes it difficult in particular to prepare relatively large batches for pharmaceutical purposes. It is possible by extending the alkyl or acyl 25 chains of the apolar moiety to achieve, because of steric factors, an arrangement of the molecules with less curvature on formation of vesicles. The result is the formation of larger liposomes, which can be achieved by ultrasound treatment without extrusion 30 processes. In order to keep the phase transition temperature of phospholipids with extremely long fatty acids (with more than 22 C atoms) in a range which is favorable for liposome formation, fatty acids with a cis double bond located as near the middle as possible 35 are used. Such extremely long-chain fatty acids occur in only small amounts in nature.

Phospholipid compounds can also be employed directly as active pharmaceutical ingredients. The antineoplastic and immunomodulatory effect of lysolecithins (which have only one instead of two fatty acids on the glycerol) and ether lysolecithins in cell culture experiments has been known for more than 30 years. The basic precondition for antineoplastic activity of lysophospholipids and analogs is accumulation in the diseased tissue. Lysophosphatidylcholines are readily metabolized by phospholipases or acyltransferases and are no longer available to the body, whereas ether lysolecithins can be detoxified by oxidative cleavage of the ether linkage or acylation of the *sn*-2 position. This is why substances which are less good substrates for phospholipid-metabolizing enzymes but still have a lysolecithin-like structure have been synthesized. The first phosphocholine with antitumor activity found was the ether lipid 1-O-octadecyl-2-O-methyl-rac-glycero-3-phosphocholine (ET18-OCH<sub>3</sub>, also known as edelfosine). ET18-OCH<sub>3</sub> shows excellent antineoplastic activity in cell-culture experiments but proved to be virtually inactive in complex organisms.

Dispensing with glycerol as basis of the structure results in the metabolically more stable alkylphosphocholines (APC), substances which accumulate in membranes and have a marked effect in cell properties. Alkylphosphocholines do not occur in nature and are phosphocholine esters of long-chain alcohols which, because of their simplified structure, now have substrate properties only for phospholipase D. The best known representative to date of this class of substances is hexadecylphosphocholine (HePC), an alkylphosphocholine which was approved as medicine in 1992 under the name Miltex<sup>®</sup> (active ingredient: miltefosine) and has therefore also been intensively investigated. HePC is employed for the topical treatment of breast cancers and lymphomas with cutaneous metastases.



Alkylphosphocholines not only reduce tumors but also activate cytotoxic macrophages and inhibit the invasion of healthy tissue by neoplastic cells. Recent investigations have shown that APCs (and especially

5 HePC) are potent active ingredients for controlling leishmaniosis and trypanosomiasis. Direct intravenous administration of an HePC solution causes thrombophlebitis in rats. In clinical studies, HePC shows toxicities in the gastrointestinal tract on oral

10 administration and therefore cannot be administered in effective concentrations. One exception is HePC for controlling leishmaniosis: HePC acts in doses so low that the side effects described above do not occur.

15 The first intravenously injectable alkylphosphocholine to be found was erucylphosphocholine (ErPC), a phosphocholine with a C<sub>22</sub>-alkyl chain and cis double bond in the  $\omega$ -9-position. It has emerged that structural variations in the apolar region of unsaturated and thus

20 intravenously administrable alkylphosphocholines, for example on shifting the double bond to the  $\omega$ -12 or  $\omega$ -6 position, lead to improved antitumor activity compared with erucylphosphocholine, the most effective compound to date (see table 2 in example 5).

25 Phospholipids are also used as solubilizers for drugs of low solubility in water. Once again, these solubilizing properties can be improved by modifying the apolar region.

30 To date it has been possible to modify specifically only the polar moiety in the synthesis of phospholipids of the abovementioned classes. It has to date been possible to use for the apolar portion only

35 commercially available fatty acids and naturally occurring fatty acids.

Phospholipids occurring in nature and specifically in mammals mainly comprise unbranched fatty acids with 8 to 24 C atoms which, owing to their biosynthesis, have almost exclusively an even number of carbon atoms.

5 Unsaturated fatty acids usually have 1 to 4 double bonds, mainly in the cis configuration. Naturally occurring monounsaturated fatty acids usually have the double bond in the middle, i.e. in palmitoleic acid it is located at the  $\omega$ -7 position or at the (Z)-9 position  
10 in the preferred notation used in the examples herein. The higher fatty acids oleic, eicosenoic, erucic and nervonic acid each have the double bond at the  $\omega$ -9 position in the carbon chain or, correspondingly, at the (Z)-9, (Z)-11, (Z)-13 and (Z)-15 position in the  
15 notation preferred herein.

In polyunsaturated fatty acids, the positions of the unsaturations are such that in each case there is only one CH<sub>2</sub> group between them. This is important for  
20 making the autoxidation of the fatty acids possible. However, it would be advantageous, precisely on use of phospholipids as drugs or liposomes, to prevent the autoxidation in order to obtain more stable compounds. This can be achieved only by compounds in which the  
25 unsaturations in the alkyl and acyl chains are more than one methylene group apart.

German patent application DE 197 35 776.8 discloses phospholipid-analogous compounds as liposome con-  
30 stituents, active pharmaceutical ingredients or solubilizers, which contain saturated or mono-unsaturated acyl or alkyl radicals, with the total of the carbon atoms in the acyl and alkyl being between 16 and 44.

35

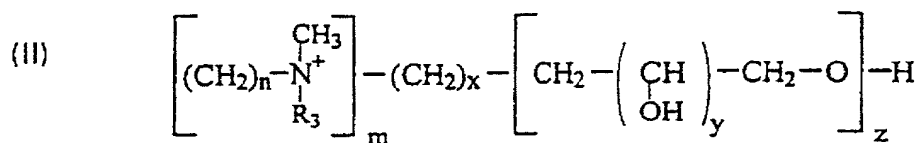
It was therefore an object of the present invention to provide compounds which, owing to modifications in the apolar region, have improved properties for the

aforementioned applications and, in addition, can be prepared on an industrial scale. It was a further object of the present invention to make it possible, by a novel process, to prepare unsaturated fatty acids in which the double bonds are at positions which do not occur in naturally occurring mono- and diunsaturated fatty acids, or to provide a process which makes it possible to prepare monounsaturated fatty acids which are difficult to obtain, for example nervonic acid, in industrial quantities.

This object is achieved according to the invention by a compound of the general formula (I)



in which B is a radical of the general formula (II)



in which

n is an integer from 2 to 8;

m is 0, 1 or 2;

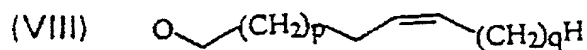
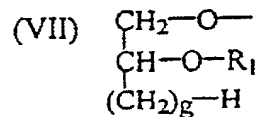
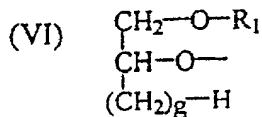
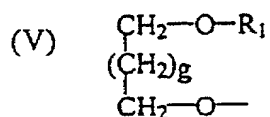
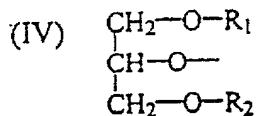
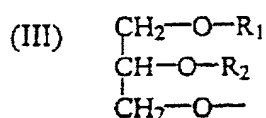
x is an integer from 0 to 8;

y is an integer from 1 to 4;

z is an integer from 0 to 5;

R<sub>3</sub> is an alkyl radical having 1 to 3 C atoms, which may be substituted by one or more hydroxyl groups;

and in which A is a radical selected from one of the formulae (III) to (IX):



5

in which

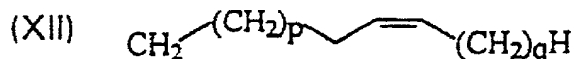
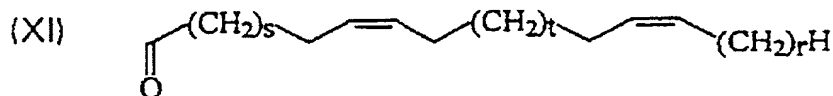
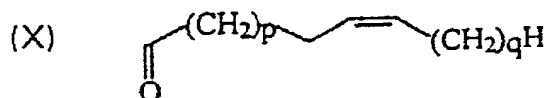
g is an integer from 0 to 8;

p, q, r, s, t ≥ 0;

12 ≤ p + q ≤ 30 and

8 ≤ s + t + r ≤ 26;

- 10 where R<sub>1</sub> and R<sub>2</sub> are each independently hydrogen, a saturated or unsaturated acyl or alkyl radical or a radical selected from one of the formulae (X), (XI), (XII) and (XIII), and at least one of R<sub>1</sub> and R<sub>2</sub> is a radical selected from one of the formulae (X), (XI),
- 15 (XII) and (XIII):



where  $q \neq 8$  for  $p + q = 14, 16, 18$  or  $20$ , if neither of the radicals  $R_1$  and  $R_2$  is a radical of the formula (XI) or (XIII), or if A is a radical of the formula (VIII).

5 The structural elements used in the substances described herein can be varied as desired and tailored to suit the particular use. Particularly preferred monounsaturated acyl and alkyl radicals are those whose double bond is not in a natural position. Compounds in  
10 which both the radicals  $R_1$  and  $R_2$  are naturally occurring monounsaturated acyl or alkyl chains, such as, for example, those having the C=C bond in the  $\omega$ -9 position, thus do not form part of the invention. The process of the invention makes it possible to choose  
15 the position of the double bond(s) without restriction, so that previously inaccessible alkyl/acyl chains can be prepared. As already explained above, the cis double bonds of natural diunsaturated alkyl and acyl chains are in each case separated by only one methylene group.  
20 Such compounds are unstable at room temperature in the presence of oxygen and must therefore be stored at low temperatures under nitrogen. The possibility of synthesizing (Z)-fatty acids and (Z)-alkenols with the alkyl or acyl chains of the formulae (IX), (XI) and  
25 (XIII) having 16 to 34 C atoms allows structural elements in which there are at least 2 methylene groups between the unsaturations to be provided. This results in a considerable stabilization of the fatty acids and alcohols and of the classes of compounds synthesized  
30 therefrom. Compounds of the invention can be stored without difficulty at room temperature without inert gas. The term (Z)-fatty acids or -alkenols as used herein encompasses both mono- and diunsaturated chains with one or two cis double bonds.

35

The advantage of the particularly preferred alkyl and acyl chains with two double bonds is that the physicochemical properties are favorable. Thus, for

example, the diunsaturated fatty acids (Z,Z)-10,19-octacosadienoic acid, which is based on a 28 carbon chain, is liquid at room temperature, whereas monounsaturated fatty acids of this chain length occur  
5 only in the solid state at 20°C, irrespective of the position of the cis double bond. The incorporation of the structures of the invention into phospholipids makes it possible to transfer these favorable properties to the compounds of the invention, which is  
10 reflected inter alia in low phase transition temperatures. It is likewise possible, by extending the fatty acid chains, to more than double the vesicle diameter compared with liposomes prepared from conventional lecithins, which corresponds to the  
15 internal volume of ultrasound-prepared liposomes being eight times as large. It is thus possible to transport more than eight times as much active ingredient as is possible with conventional liposomes. In addition, preparations of large unilamellar vesicles (LUVs) in  
20 highly viscous solutions, for example sugar solutions, are possible, that is to say in a medium in which it is difficult to prepare liposomes by extrusion processes. The phase transition temperatures of the phospholipids with the extremely long fatty acids of the invention  
25 are, because of the cis double bond(s), in a region favorable for liposome preparations.

The compound of the general formula (I) has two variable components A and B, each of which can be  
30 modified individually. The compound of the invention of the formula (I) does not comprise a mixture of different molecules of indeterminate composition and chain length; on the contrary it is possible specifically to obtain a desired structure. This means that,  
35 if the desired product is an N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ammonium derivative, with  $y = 1$  and  $z = 2$  in formula (I), the compound is chemically defined and contains scarcely any

contributions from  $y = 1$  and  $z = 1$  or  $y = 1$  and  $z = 3$  etc. Preference is given to the use of hydroxypropyl derivatives of a very particular chain length essentially free of other chain lengths.

5

The compound of the formula (I) is, according to the invention, a homogeneous compound of defined structure. The compound is preferably more than 99% homogeneous in relation to the value of  $z$ . However, it is also possible to provide the compound with a homogeneity of more than 99.9% in relation to the value of  $z$ .

10

For B in the compound of the formula (I), preference is given to  $m = 1$  with  $n = 2$  to 8. Particular preference is given to  $n = 2$  to 6, and even greater preference to 2 to 4. When  $z = 0$ ,  $x$  is preferably an integer from 1 to 3 and is even more preferably 1.

15

If  $z = 1$ ,  $y$  preferably has a value from 1 to 4, and if  $z = 1$  to 5,  $y$  is preferably 1. In the case where  $y > 1$ , the radical  $-\text{CH}_2(\text{CHOH})_y-\text{CH}_2-\text{OH}$  is preferably derived from sugar alcohols having four hydroxyl groups for  $y = 2$ , five hydroxyl groups for  $y = 3$  and six hydroxyl groups for  $y = 4$ . Examples of such radicals are mannitol derivatives for  $y = 4$ , lyxitol derivatives for  $y = 3$  and threitol derivatives for  $y = 2$ .

20

25

It is possible and also preferred for  $x$  to be 0. In this case,  $y$  is 2 to 4 for  $z = 1$ . Or, in another preferred embodiment,  $z = 1$  to 5 for  $y = 1$ .

30

It is possible and also preferred for  $m$  to be 0, in which case the compound of the formula (I) has a negative excess charge because of the negatively charged  $\text{PO}_3^-$  group. For  $m = 0$ ,  $x$  is preferably 0, and  $y = 1$  for  $z = 1$  to 5, or, in a likewise preferred embodiment,  $y = 2$  to 4 for  $z = 1$ .

35

The radical  $R_3$  is preferably  $CH_3$ ,  $C_2H_5$  or 1,2-dihydroxypropyl.

The groups of the formulae (III) to (VII) are preferably in enantiopure form. However, they may also be racemates.

The compound of the formula (I) is according to the invention a compound of defined structure.  
10 Monounsaturated alkyl chains are preferably more than 97% homogeneous, but may also be provided with homogeneity of more than 99%. Diunsaturated alkyl chains are preferably more than 90% homogeneous, but may also in some cases be provided in purities of  
15 > 97%.

The compound preferably comprises phospholipids with mono- or diunsaturated alkyl or acyl chains having 16-34 chain carbon atoms.

20 The compounds encompassed by the general formula (I) have excellent biological properties and are used as

1. liposome constituents for preparing liposomes for  
25 targeted accumulation of active ingredients or nucleic acids in target cells (alkyl/acyl chain length preferably 16-32 C atoms)

2. active ingredients against oncoses and protozoal  
30 infections (alkyl/acyl chain length preferably 16-26 C atoms) and

3. solubilizers for substances which are difficult to administer intravenously, such as, for example, Taxol  
35 (alkyl/acyl chain length preferably 16-30 C atoms).

Conventional liposomes have a residence time in serum of up to 5 hours but, especially on use of liposomes as



carriers of active pharmaceutical ingredients, it is desirable for the residence time of liposomes in the bloodstream to be as long as possible, but especially in conjunction with uptake in selected target cells.

5

It has emerged from ultrasound preparations of liposomes that symmetrical lecithins with (Z)-fatty acids having up to 24 carbon atoms form liposomes when mixed with cholesterol, and the homogeneity of the vesicle population is crucially determined by the position of the double bond. The precondition for a narrow standard deviation of the vesicle size is a particular distance of the double bond from the carboxyl function. There is evidently, by comparison with conventional lecithins, a significant increase in the vesicle diameter, which is 125 nm for (Z)-15-tetracosenoic acid (nervonic acid). Mixed-chain phosphatidylcholines with a saturated acyl chain in the sn-1 position also form vesicles with very long-chain (Z)-fatty acids, and it is to be assumed that there is interdigitation of the fatty acid chains. The average hydrodynamic liposome diameter on esterification with (Z)-15-triacontenoic acid (30:1  $\Delta^{15}$ ) is 111 nm (stearic acid in the sn-1 position). A distinct enlargement of vesicles is also obtained by use of extremely long fatty acids in the case of phospholipids having a modified polar region, such as, for example, in the case of phosphatidyloligoglycerols, or in the case of phospholipids containing oligoglycerols linked via nitrogen atoms.

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25  
30

When the compound of the invention of general formula (I) is used as liposome constituent, the constituent A is preferably two-chain radical derived from glycerol, of the formulae (III) or (IV). In constituent B, these compounds preferably have an alkylammonium group, i.e. m is preferably equal to 1. The preferred parameters

35

for compounds of the formula (I) used as liposome constituents are:

$m = 1, n = 2-6, x = 0, y = 1, z = 1-5$  or

$m = 1, n = 2-6, x = 0, y = 2-4, z = 1$  or

5  $m = 1, n = 2-6, x = 1, z = 0$  or

$m = 0, x = 0, y = 1, z = 1-5$ , preferably 2-4 or

$m = 0, x = 0, y = 2-4, z = 1$ .

$R_3$  is in this case preferably 1,2-dihydroxypropyl,  $C_2H_5$  or even more preferably  $CH_3$ . The compound preferably  
10 comprises hydroxypropyl derivatives with 1 to 3 hydroxypropyl units, i.e.  $x = 0$  and  $z = 1$  to 3. Since  $y$  is preferably 1, these involve 1,3-linked linear oligoglycerol residues which are linked to the nitrogen atom via a 2-hydroxypropyl radical.

15

These compounds which are suitable as liposome constituents preferably have 2 radicals, that is to say  $R_1$  and  $R_2$ . These may be in each case independently a radical of one of the formulae (X) to (XIII). If  $R_1$  and  
20  $R_2$  are identical, they preferably have a maximum chain length of, in each case, 16 to 26 C atoms. In another preferred embodiment, one of the radicals is longer than 26 C atoms and may preferably have up to 32 C atoms. In this case, a methyl radical is preferably  
25 present on the nitrogen, i.e. when  $z = 0$ ,  $x$  is preferably 1. It is likewise preferred for at least of  $R_1$  and  $R_2$  to be a diunsaturated radical of the invention, and it is even more preferred for both  $R_1$  and  $R_2$  to be a diunsaturated radical of the invention.

30

One of the radicals  $R_1$  and  $R_2$  may also be a saturated acyl or alkyl radical. In this case, the other radical is a compound of one of the formulae (X) to (XIII), and is preferably a diunsaturated alkyl or acyl chain of  
35 the formula (XI) or (XIII).

In another preferred embodiment, the compound of the general formula (I) as liposome constituent may also

have a negative excess charge. This is the case when  $m = 0$ . Preference is given in this connection to glycerol-glycerols and phosphatidyl-glycerol-glycerol-glycerols and phosphatidyl-glycerol-glycerol-glycerol-glycerols (in these cases,  $x = 0$ ,  $y = 1$  and  $z = 2$  to 4). Additionally preferred in this connection are the previously mentioned compounds with  $y > 1$ , i.e. the radical  $\text{CH}_2-(\text{-CHOH})_y\text{-CH}_2\text{-OH}$  is preferably derived from sugar alcohols having 4 hydroxyl groups for  $y = 2$ , 5 hydroxyl groups for  $y = 3$  and 6 hydroxyl groups for  $y = 4$ . Likewise preferred in this connection are phospho-*sn*-G<sub>1</sub> compounds.

Active ingredients of the invention are preferably compounds of the general formula (I) in which the structural parameter A is a radical of one of the formulae (VIII) or (IX). They are therefore unsaturated alkylphosphocholines.

The advantage of unsaturated chains in the apolar region is that such compounds can be administered intravenously. Active ingredients of the invention have better antitumor activity than erucylphosphocholine, the most effective compound to date. An increased cytostatic effect is obtained, for example, by shifting the *cis* double bond toward the phosphocholine group. Thus, even with the lowest dose, (Z)-10-docosenyl-1-phosphocholine (42  $\mu\text{mol/kg/week}$ ) shows a tumor reduction to 9% (T/C), whereas erucylphosphocholine with a dose which is more than twice as high (90  $\mu\text{mol/kg/week}$ ) shows a reduction only to 31% (T/C) (see example 5, table 1).

The preferred parameters for compounds of the formula (I) which are suitable as active ingredients are:  
 $m = 1$ ,  $n = 2-6$ , more preferably  $n = 2-4$ ,  $x = 1$ ,  $z = 0$ .

Compounds of the general formula (I) are particularly suitable as active pharmaceutical ingredients when they have an alkylammonium radical (i.e.  $m = 1$ ) with which the distance between ammonium and phosphate is greater than or equal to 2, i.e.  $n$  is preferably 2, 3 or 4. In this case,  $R_3$  is preferably a  $CH_3$  or  $C_2H_5$  group. It is likewise preferred for  $R_3$  to be 1,2-dihydroxypropyl. These compounds are particularly active antitumor agents.

The most preferred compounds are those having an N,N,N-trimethylalkylammonium group, so that preference is given to  $z = 0$  and  $x = 1$ .

It is preferred to dispense with a glycerol basic structure or a similar basic structure according to one of the formulae (III) to (VII) for active ingredients. The structural parameter A is thus preferably a compound of the formulae (VIII) or (IX). These are therefore preferably (Z)-alkenylphosphocholines or (Z,Z)-alkadienylphosphocholines.

If a monounsaturated alkyl radical is present, this preferably has 16 to 23 carbon atoms. This is because it has emerged that compounds with chains having 24 C atoms or more are distinctly less suitable. With a diunsaturated alkyl radical, longer chains are suitable, preferably having about 19 to 26 C atoms. It has emerged that diunsaturated chains with 16 to 18 carbon atoms are inactive. It should be particularly emphasized in this connection that alkadienylphosphocholines with a terminal double bond (i.e.  $r = 0$ ) in formula (IX) have a marked antitumor effect even at very low dosage.

Compounds with a glycerol-like constituent also show antitumor activity, i.e. a compound according to one of the formulae (III) to (VII) may also be present on the

phosphate residue. If in this case 2 radicals  $R_1$  or  $R_2$  are present, however, it is important that one R is a short chain. This short chain is preferably an alkyl radical having 1 to 4 C atoms. The other radical  $R_1$  or  $R_2$  is then preferably a radical of the formula XII or XIII. It is, in particular, a radical of the formula XIII.

Additionally preferred compounds are those in which both radicals  $R_1$  and  $R_2$  are each linked by an ether linkage to the glycerol residue, i.e. they are each independently a group of the formula (XII) or (XIII). Particular preference is also given to a compound where  $R_1$  and  $R_2$  are the same mono- or diunsaturated radical of the invention.

Mention should be made, as another preferred embodiment of the compound of the general formula (I), of compounds which are distinguished by a good solubilizing property. The preferred structural parameters for compounds of the formula (I) suitable as solubilizers are:

$m = 1$ ,  $n = 2-6$ ,  $x = 0$ ,  $y = 1$ ,  $z = 1-3$ , more preferably  $z = 1$ ,  
 $m = 1$ ,  $n = 2-6$ ,  $x = 0$ ,  $y = 2-4$ ;  $z = 1$  or  
 $m = 1$ ,  $n = 2-6$ ,  $x = 1$ ,  $z = 0$ .

$R_3$  is preferably  $CH_3$ ,  $C_2H_5$  or 1,2-dihydroxypropyl.

Known compounds of this type encompass, for example, the erucyl ( $C_{22}$ ) compounds. The compounds of the invention which are therefore preferred are those which have as structural parameter A a group according to one of the formulae (III) to (VII), where one of the radicals  $R_1$  and  $R_2$  is preferably a compound of the formulae (X) or (XI), i.e. one of the radicals  $R_1$  or  $R_2$  is preferably a diunsaturated chain according to the invention. Single-chain compounds are preferred for the solubilizers, i.e. when A is a group of the formulae

(III) or (IV), and one of  $R_1$  and  $R_2$  is -OH or an alkyl having 1 to 4 C atoms.

When A is a radical according to one of the formulae  
5 (V) to (VII), i.e. when only one  $R_1$  is present,  $R_1$  is likewise preferably a diunsaturated chain. Solubilizers of the invention are preferably in the form of esters, i.e. chains of the formula (X) or (XI) are preferred. Very particular preference is given in this connection  
10 in turn to compounds with one or two diunsaturated alkadienyl radicals. Some compounds of the classes already mentioned previously are also suitable here too. One example are the single-chain glycerophospho compounds not hydroxylated on the nitrogen, i.e.  $m = 1$ ,  
15  $x = 1$  and  $z = 0$  in the structural parameter B.

Compounds particularly preferred as solubilizers are those having only one long-chain radical such as, for example, compounds based on lysolecithin which have an  
20 OH group on a C atom of the glycerol residue. Particularly preferred compounds are therefore those in which the structural parameter A is a radical according to one of the formulae (III) to (VII).

25 Some compounds with 2 radicals  $R_1$  and  $R_2$  also display particularly good solvent properties, however. Examples are those compounds in which  $R_1$  and  $R_2$  are two diunsaturated radicals having 16 to 24 C atoms.

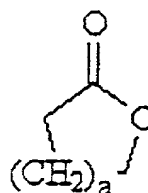
30 The present invention further relates to a process for preparing unsaturated (Z)-fatty acids or (Z,Z)-fatty acids or (Z)-alkenols or (Z,Z)-alkenols having 16 to 34 carbon atoms, the process of the invention making available diunsaturated (Z,Z)-fatty acids and alkenols  
35 which have more than one  $\text{CH}_2$  group between the cis double bonds. A lactone which may comprise 13 to 19 C atoms is used as starting material for this process.

The process comprises the following steps:

- 1) cleavage of the lactone ring with a trimethylsilyl halide to give the corresponding trimethylsilyl halo-carboxylate,
- 2) simultaneous or subsequent alcoholysis of the trimethylsilyl halo-carboxylate to give the corresponding halo-carboxylic ester,
- 3) reaction of the halo-carboxylic ester with triphenylphosphane to give the corresponding phosphonium salt,
- 4) reaction of the phosphonium salt with an aldehyde using a base and subsequent hydrolysis to give a corresponding (Z)-fatty acid salt,
- 5) liberation of the (Z)-fatty acid from the (Z)-fatty acid salt, and
- 6) where appropriate conversion of the (Z)-fatty acid into the corresponding (Z)-alkenol using lithium aluminum hydride.

In step 1) there is preferably use of lactones of the formula (XIV)

(XIV)



where  $a = 10$  to  $16$ . The trimethylsilyl halides used to cleave the lactone ring are preferably trimethylsilyl iodide or trimethylsilyl chloride. The alcohol used for the alcoholysis in step 2) is preferably ethanol. The reaction of the phosphonium salt with an aldehyde is based on the procedure for a Wittig reaction in the absence of lithium salts, which is also referred to as a salt-free Wittig reaction. The stereoselectivity of such reactions is generally elicited by sodium- or potassium-containing bases, and therefore preferred

bases are, for example,  $\text{NaNH}_2$ , potassium tert-butoxide, NaHMDS or KHMDS. NaHMDS is particularly preferred. The hydrolysis and subsequent liberation and, where appropriate, the conversion of the fatty acids into an alkenol takes place by known processes.

A particularly preferred embodiment of the process of the present invention is the process for preparing nervonic acid ((Z)-15-tetracosenoic acid). This entails using cyclopentadecanolide as starting lactone and pelargonaldehyde as aldehyde in step 4. This process can be used to synthesize nervonic acid, which occurs only in small amounts in nature, even on an industrial scale.

The present invention further relates to liposomes comprising phospholipid-like compounds of the formula (I) as constituents of the liposome shell. These liposomes additionally contain phospholipids and/or alkylphospholipids and, where appropriate, cholesterol, the liposomes containing 1 to 50 mol% of a compound according to the invention of the formula (I) or salt thereof and, together with the phospholipids, the alkylphospholipids and the cholesterol, resulting in 100 mol% of the liposome shell.

The liposomes of the invention have a distinctly increased internal volume. They are thus able to transport a larger amount of active ingredient and/or nucleic acids. Preferred liposomes of the invention additionally comprise an active ingredient and, where appropriate, pharmaceutically acceptable diluents, excipients, carriers and fillers. The liposomes may comprise a nucleic acid in addition to the active ingredient or in place of the active ingredient. It is also possible according to the invention to use as active ingredients the active ingredients of the invention.



The present invention further relates to a pharmaceutical composition which comprises as active constituent a compound of the formula (I) which is  
5 suitable as active ingredient. The pharmaceutical composition may moreover additionally comprise pharmacologically acceptable diluents, excipients, carriers and fillers.

10 The present invention further relates to the use of the compounds of the invention as liposome constituents, as pharmacological active ingredients or as solubilizers. It has emerged that some of the compounds of the invention show a particularly good antitumor effect.  
15 Compounds of the invention can be employed not only as antitumor active ingredient but also against protozoal infections such as, for example, leishmaniosis or trypanosomiasis. They can likewise be used to promote the solubility of substances of low solubility in  
20 water, for example Taxol, so that these substances can also be administered intravenously in conjunction with the solubilizers of the invention.

The active ingredients which can be used are generally  
25 all active ingredients which can in fact be introduced by means of liposomes into the plasma. Preferred groups of active ingredients are, on the one hand, cytostatics, especially anthracycline antibiotics, such as, for example, doxorubicin, epirubicin or daunomycin,  
30 with doxorubicin being particularly preferred. Further preferred cytostatics are idarubicin, alkylphosphocholines in the structural variations described by us, 1-octadecyl-2-methyl-rac-glycero-3-phosphocholine and structural analogs derived therefrom, 5-fluorouracil,  
35 cis-platinum complexes such as carboplatin and Novantrone, and mitomycins.

Further preferred groups of active ingredients are immunomodulating substances such as, for example, cytokines, and among these in turn interferons and, in particular,  $\alpha$ -interferon are particularly preferred, substances with antimycotic activity (for example amphotericin B) and active ingredients against protozoal infections (malaria, trypanosome and leishmania infections). Taxol is likewise preferred as active ingredient.

A further preferred group of active ingredients are lytic active ingredients as described in DE 41 32 345 A1. Miltefosine, edelfosine, ilmofosine and SRI62-834 are preferred. Alkylphosphocholines, also with extended alkyl chains, for example erucylphosphocholine and erucylphosphocholines with extended phospho-nitrogen distance, are particularly preferred.

The present invention further relates to the use of liposomes of the invention for producing an antitumor composition, where the active ingredient is particularly preferably doxorubicin.

The present invention additionally relates to the use of the liposomes of the invention for producing a composition for influencing the proliferation of cells, where the active ingredient is a cytokine, particularly preferably  $\alpha$ -interferon.

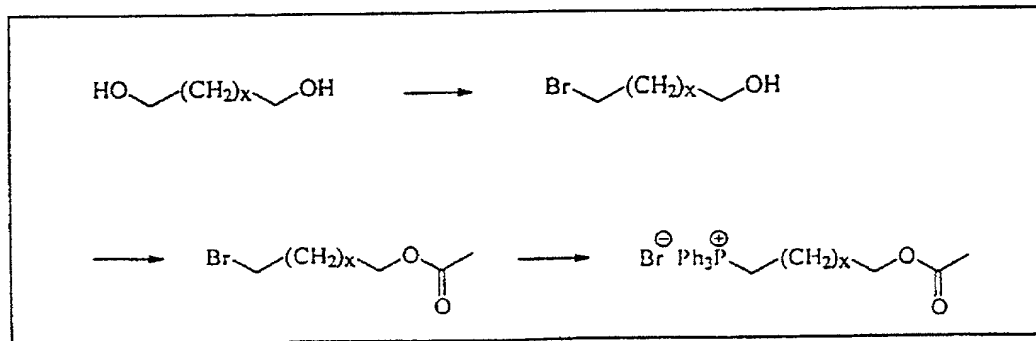
The liposomes of the present invention can thus also be used as transport vehicles and specifically as gene transport vehicles.

The process and the compounds of the general formula (I) are illustrated in more detail in the following examples.

Examples**Example 1: Synthesis of  $\omega$ -substituted phosphonium salts****1a) Synthesis by monobromination of  $\alpha,\omega$ -diols**

5 The starting materials used for synthesizing olefinic alcohols are alkanediols, which are monobrominated with 48% strength hydrobromic acid to give  $\omega$ -bromoalkan-1-ols. After acetylation of the remaining hydroxyl group, the compounds are fused with triphenylphosphane to give

10 the triphenylphosphonium bromides substituted in the  $\omega$  position. The latter are deprotonated with NaHMDS and then converted into olefins with unsubstituted aldehydes and subsequently hydrolyzed to (Z)-fatty alcohols.



Synthesis of [ $\omega$ (acetoxy)alkyl]triphenylphosphonium bromides by monobromination of  $\alpha,\omega$ -diols

Monobromination6-Bromo-1-hexanol

20 200.8 g (1.70 mol) of 1,6-hexanediol, 600 ml of 48% strength hydrobromic acid and 2 l of toluene were heated under reflux with vigorous stirring for 2 hours.

25 After cooling to room temperature, the phases were separated. The organic phase was washed with 2  $\times$  500 ml of saturated  $\text{NaHCO}_3$  solution and 700 ml of water. Removal of the solvent resulted in 301.2 g (1.66 mol,

30 98%) of 6-bromo-1-hexanol.  
MW = 181.07 g/mol ( $\text{C}_6\text{H}_{13}\text{BrO}$ )

$R_f$  (precursor) = 0.19 (diethyl ether)

$R_f$  = 0.59 (diethyl ether)

#### 10-Bromo-1-decanol

- 5 87.8 g (0.50 mol) of 1,10-decanediol, 165.1 g of 48% strength hydrobromic acid and 2.5 l of high-boiling petroleum ether (b.p. 100-140°C) were heated under reflux with vigorous stirring for 4 hours. A further 80.0 g of 48% strength hydrobromic acid were added, and
- 10 the mixture was boiled for 5 hours. After cooling to 30°C, the phases were separated. The organic phase was washed first with a solution of 100 g of  $\text{Na}_2\text{CO}_3$  in 500 ml of water and then with 2 x 500 ml of water. Removal of the solvent was followed by chromatography
- 15 on 700 g of silica gel. The byproduct 1,10-dibromodecane was eluted with cyclohexane/diethyl ether (20:1). Chromatography with cyclohexane/diethyl ether (2:1) afforded 103.9 g (0.44 mol, 87%) of 10-bromo-1-decanol.
- 20 MW = 237.18 g/mol ( $\text{C}_{10}\text{H}_{21}\text{BrO}$ )  
 $R_f$  = 0.38 (diisopropyl ether)  
 $^1\text{H-NMR}$  (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  = 1.30-1.43 (m, 12H,  $(\text{CH}_2)_6$ ), 1.57 (m, 2H,  $\text{CH}_2\text{CH}_2\text{OH}$ ), 1.85 (mc, 2H,  $\text{CH}_2\text{CH}_2\text{Br}$ ), 2.22 (s,  $\text{D}_2\text{O}$ -exchangeable, 1H, OH), 3.41 (t,  $^3J$  = 6.9 Hz, 2H,  $\text{CH}_2\text{Br}$ ), 3.64 (t,  $^3J$  = 6.7 Hz, 2H,  $\text{CH}_2\text{OH}$ )
- 25

#### Acetylation to give $\omega$ -bromoalkyl acetates

- Acetylation of the  $\omega$ -bromoalkan-1-ols is carried out with acetic anhydride in THF with catalysis by DMAP.
- 30 The esterifications take place rapidly at 30°C, irrespective of the chain length of the compound, and are complete only a few minutes after addition of the reactive anhydride.

#### 35 6-Bromohexyl acetate

20.1 g (0.16 mol) of DMAP were added to 297.4 g (1.64 mol) of 6-bromo-1-hexanol in 1500 ml of THF. A solution of 184.4 g (1.81 mol) of acetic anhydride in

300 ml of THF was added dropwise in such a way that the reaction temperature did not exceed 30°C. After completion of the addition, the mixture was stirred for a further 30 minutes. The reaction mixture was mixed  
5 with 500 ml of diisopropyl ether and extracted successively with 700 ml each of water, 2 x saturated NaHCO<sub>3</sub> solution and water. After drying over sodium sulfate, the solvent was removed in vacuo. 352.8 g (1.58 mol, 96%) of 6-bromohexyl acetate were obtained.

10 MW = 223.11 g/mol (C<sub>8</sub>H<sub>15</sub>BrO<sub>2</sub>)

R<sub>f</sub> = 0.81 (diethyl ether)

<sup>1</sup>H-NMR (300 MHz, CDCl<sub>3</sub>): δ = 1.33-1.53 (m, 4H, (CH<sub>2</sub>)<sub>2</sub>),  
165 (mc, 2H, CH<sub>2</sub>CH<sub>2</sub>O), 1.87 (mc, 2H, CH<sub>2</sub>CH<sub>2</sub>Br), 2.04 (s,  
3H, OOCCH<sub>3</sub>), 3.41 (t, <sup>3</sup>J = 6.8 Hz, 2H, CH<sub>2</sub>Br), 4.06 (t,

15 <sup>3</sup>J = 6.7 Hz, 2H, CH<sub>2</sub>O)

IR (film): ν[cm<sup>-1</sup>] = 2937 (s), 2859 (s), 1736 (s), 1460 (m), 1365 (m), 1240 (s), 1044 (m), 731 (w), 641 (w), 561 (w)

20 Quaternization to give phosphonium bromides

*[10-(Acetoxy)decyl]triphenylphosphonium bromide*

117.3 g (0.42 mol) of the appropriate ω-substituted alkyl bromide/iodide and 110.2 g (0.4 mol) of triphenylphosphane were heated at 130°C with stirring  
25 (glass stirrer) for 12 hours. The heating was removed and the mixture was allowed to cool to 90°C. 400 ml of THF were slowly added through the reflux condenser to the reaction mixture, which was stirred until a homogeneous phase was formed. It was allowed to cool to  
30 room temperature.

Addition of 2 l of diethyl ether was followed by vigorous stirring for 30 minutes. After standing for several days at -20°C, the supernatant solvent was  
35 decanted off from the solid phosphonium salt. The product was mixed with 800 ml of toluene and stirred at 60°C for several hours. After phase separation, the phosphonium salt was taken up in 300 ml of

dichloromethane. 3 l of diethyl ether were added and the mixture was left at -20°C for several days. After renewed decantation off, the product was dissolved in dichloromethane and transferred into a flask. The phosphonium salt was dried in vacuo at 80°C for 6 hours. 181.6 g (335 mmol, 80%) of [10-(acetoxy)-decyl]triphenylphosphonium bromide were obtained as a yellow, highly viscous oil.

MW = 541.51 g/mol ( $C_{30}H_{38}BrO_2P$ )

10  $R_f$  = 0.23 (chloroform/methanol, 9:1)

Analysis:	C	H	P
Calculated	66.54	7.07	5.72
Found	66.67	7.06	5.55

#### 15 1b) Synthesis via $\omega$ -halo carboxylic acids

##### *Ethyl 11-bromoundecanoate*

1000 g of 90% pure 11-bromoundecanoic acid (equivalent to 3.39 mol), 304.0 g (6.60 mol) of ethanol and 20.0 g of p-toluenesulfonic acid were introduced into 400 ml of chloroform in an experimental apparatus with water trap (for entrainers with higher specific gravity than water). The mixture was heated under reflux until water no longer separated out (about 6 hours). After the solution had cooled to room temperature it was washed successively with 1 l of water, 500 ml of saturated  $NaHCO_3$  solution and 1 l of water. The solvent was removed in vacuo. Vacuum distillation (b.p. 131-133°C/1 mbar) resulted in 716.3 g (2.44 mol, 72%) of ethyl 11-bromoundecanoate.

30 MW = 293.24 g/mol ( $C_{13}H_{25}BrO_2$ )

$R_f$  = 0.66 (cyclohexane/diisopropyl ether, 1:1)

Analysis:	C	H
Calculated	53.25	8.59
Found	53.22	8.57

35  $^1H$ -NMR (300 MHz,  $CDCl_3$ ):  $\delta$  = 1.23-1.42 (m, 15H,  $COOCH_2CH_3$ ,  $6 \times CH_2$ ), 1.62 (mc, 2H,  $\underline{CH_2}CH_2COO$ ), 1.85 (mc, 2H,  $\underline{CH_2}CH_2Br$ ), 2.29 (t,  $^3J$  = 7.5 Hz, 2H,  $\underline{CH_2}COO$ ); 3.41

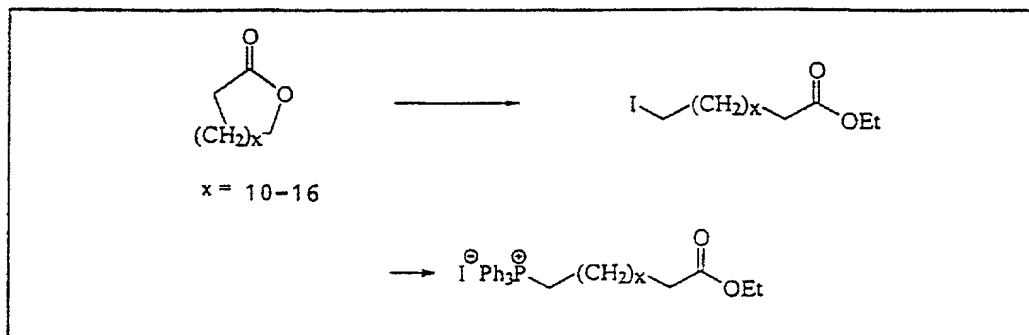
(t,  $^3J = 6.9$  Hz, 2H,  $\text{CH}_2\text{Br}$ ), 4.12 (quart,  $^3J = 7.1$  Hz, 2H,  $\text{COOCH}_2\text{CH}_3$ )

IR (film):  $\nu[\text{cm}^{-1}] = 2930$  (s), 2854 (s), 1737 (s), 1464 (m), 1372 (m), 1179 (s), 1118 (m), 723 (w), 645 (w),  
5 563 (w)

### $\omega$ -Iodo-carboxylic esters

Central intermediates in the synthesis of (Z)-15- and (Z)-16-olefins:

- 10 Lactone cleavage of cyclopentadecanolide and cyclohexadecanolide with trimethylsilyl iodide and subsequent alcoholysis results in the ethyl  $\omega$ -iodo-carboxylates.



15

Lactone cleavage

### *Ethyl 15-iodopentadecanoate*

- 150.3 g (0.63 mol) of cyclopentadecanolide were  
20 dissolved in 500 ml of acetonitrile under a nitrogen atmosphere, and 229.0 g (1.53 mol) of sodium iodide were added. 170 ml (1.34 mol) of trimethylsilyl chloride were added dropwise through a septum. The mixture was heated under reflux for 18 hours. 158.5 g  
25 (3.44 mol) of ethanol were cautiously added to the boiling reaction mixture, which was heated under reflux for a further 2 hours and then allowed to cool to room temperature. 500 ml of diethyl ether were added and the mixture was extracted three times with 500 ml of 1N  
30 sodium hydroxide solution each time. The aqueous phases were back-extracted with 300 ml of diethyl ether, and

the solvent was removed from the combined organic phases in vacuo. The residue was crystallized from methanol twice at -20°C. Drying in vacuo for several days resulted in 202.3 g (0.51 mol, 81%) of ethyl 15-iodopentadecanoate. Although the product was obtained in good purity, it had an intense odor of precursor owing to very small amounts of lactone (perfumed!).

MW = 396.35 g/mol ( $C_{17}H_{33}IO_2$ )

10  $R_f$  (intermediate) = 0.15 (dichloromethane/diisopropyl ether, 50:1)

$R_f$  = 0.73 (dichloromethane/diisopropyl ether, 50:1)

Analysis:

C

H

Calculated

51.52

8.39

15 Found

51.40

8.24

Melting point: 31.4°C

$^1H$ -NMR (300 MHz,  $CDCl_3$ ):  $\delta$  = 1.19-1.38 (m, 23H,  $COOCH_2CH_3$ ,  $10 \times CH_2$ ), 1.61 (mc, 2H,  $\underline{CH_2}CH_2COO$ ), 1.82 (mc, 2H,  $\underline{CH_2}CH_2I$ ), 2.29 (t,  $^3J$  = 7.6 Hz, 2H,  $\underline{CH_2}COO$ ), 3.19 (t,  $^3J$  = 7.0 Hz, 2H,  $\underline{CH_2}I$ ), 4.12 (quart,  $^3J$  = 7.1 Hz, 2H,  $COOCH_2CH_3$ )

20 IR (KBr):  $\nu[cm^{-1}]$  = 2916 (s), 2848 (s), 1735 (s), 1474 (w), 1464 (w), 1294 (w), 1248 (w), 1200 (m), 1166 (m), 720 (w)

#### 25 Conversion into phosphonium salts

[14-(Ethoxycarbonyl)tetradecyl]triphenylphosphonium iodide

119.0 g (0.30 mol) of the appropriate  $\omega$ -substituted alkyl bromide/iodide and 78.8 g (0.30 mol) of triphenylphosphane were heated at 130°C with stirring (glass stirrer) for 12 hours. The heating was removed and the mixture was allowed to cool to 90°C. 400 ml of THF were slowly added through the reflux condenser to the reaction mixture, which was stirred until a homogeneous phase formed. It was allowed to cool to room temperature.



The product was precipitated by adding 2 l of diethyl ether at 0°C, and the resulting mixture was stirred at 4°C for one day. It was then filtered with suction as quickly as possible through a large glass fiber filter, the residue was dissolved in dichloromethane and transferred into a flask. The solvent was removed in vacuo and then the phosphonium salt was dried in vacuo at 70°C for 7 hours (in a rotary evaporator). 197.5 g (0.30 mol, 100%) of [14-(ethoxycarbonyl)tetradecyl]triphenylphosphonium iodide were obtained.

MW = 658.64 g/mol ( $C_{35}H_{48}IO_2P$ )

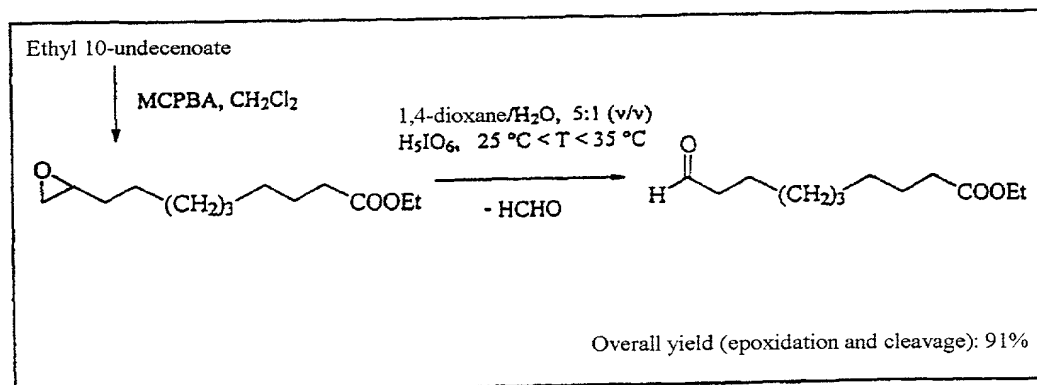
$R_f$  = 0.53 (chloroform/methanol, 9:1)

Analysis:	C	H	P
Calculated	63.83	7.35	4.70

15 Found	64.00	7.42	4.61
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$^1H$ -NMR (300 MHz,  $CDCl_3$ ):  $\delta$  = 1.19-1.28 (m, 25H,  $COOCH_2CH_3$ , 11  $\times$   $CH_2$ ), 1.63 (m, 2H,  $CH_2CH_2COO$ ), 2.28 (t,  $^3J$  = 7.5 Hz, 2H,  $CH_2COO$ ), 3.66 (m, 2H,  $CH_2P^+Ph_3I^-$ ), 4.12 (quart,  $^3J$  = 7.1 Hz, 2H,  $COOCH_2CH_3$ ), 7.69-7.86 (m, 15H, aromatic-H)

## Example 2: Synthesis of $\omega$ -substituted aldehydes



Direct epoxide cleavage with periodic acid in aqueous 1,4-dioxane

*Ethyl 10,11-epoxyundecanoate*

283.7 g (1.2 mol) of 73% pure m-chloroperoxybenzoic acid were added over the course of 1 1/2 hours to 212.4 g (1.0 mol) of ethyl 10-undecenoate in 2 l of

dichloromethane, maintaining the temperature below 20°C. After stirring at room temperature for 5 hours (glass stirrer) the reaction mixture was kept at -20°C overnight. The precipitated m-chlorobenzoic acid was  
5 filtered off with suction and washed with 500 ml of cold pentane (-20°C). The solvent was removed from the filtrate in vacuo, and the residue was taken up in 1 l of pentane. This solution was cautiously extracted with 2 x 500 ml of saturated NaHCO<sub>3</sub> solution and 500 ml of  
10 water. After drying over sodium sulfate, the solvent was removed in vacuo. The epoxide synthesized in this way still contained m-chlorobenzoic acid.

Crude yield: 259.5 g

MW = 228.33 g/mol (C<sub>13</sub>H<sub>24</sub>O<sub>3</sub>)

15 R<sub>f</sub> = 0.44 (dichloromethane/diisopropyl ether 50:1)

#### Oxidation of *o*-halo compounds using pyridine N-oxide

##### 6-Acetoxyhexanal

29.0 g (130 mmol) of 6-bromohexyl acetate, 31.6 g  
20 (332 mmol) of pyridine N-oxide, 26.8 g (319 mmol) of NaHCO<sub>3</sub> and 200 ml of toluene were heated under reflux in an inert gas atmosphere for 18 hours. The reaction solution was washed with 400 ml of water, and the aqueous phase was back-extracted with 300 ml of  
25 toluene. After the solvent had been distilled out of the combined organic phases in vacuo, the crude product was filtered through a column of 300 g of silica gel (diisopropyl ether/cyclohexane, 1:1).

Yield: 12.5 g (79 mmol, 61%)

30 MW = 158.20 g/mol (C<sub>8</sub>H<sub>14</sub>O<sub>3</sub>)

R<sub>f</sub> = 0.44 (diisopropyl ether)

Analysis:	C	H
Calculated	60.74	8.92
Found	60.66	8.92

35 <sup>1</sup>H-NMR (300 MHz, CDCl<sub>3</sub>): δ = 1.30-1.41 (m, 2H, 4-CH<sub>2</sub>), 1.57-1.68 (m, 4H, CH<sub>2</sub>CH<sub>2</sub>CHO, CH<sub>2</sub>CH<sub>2</sub>O), 2.00 (s, 3H, OOCCH<sub>3</sub>), 2.42 (dt, <sup>3</sup>J<sub>2,1</sub> = 1.6 Hz, <sup>3</sup>J<sub>2,3</sub> = 7.3 Hz, 2H,

$\text{CH}_2\text{CHO}$ ), 4.02 (t  $^3\text{J} = 6.6$  Hz, 2H,  $\text{CH}_2\text{O}$ ), 9.73 (t,  $^3\text{J} = 1.6$  Hz, 1H, CHO)

IR (film):  $\nu[\text{cm}^{-1}] = 2941$  (s), 2865 (s), 2724 (m), 1736 (s), 1462 (m), 1389 (m), 1367 (s), 1241 (s), 1048 (s),  
5 634 (m), 607 (m)

### Example 3

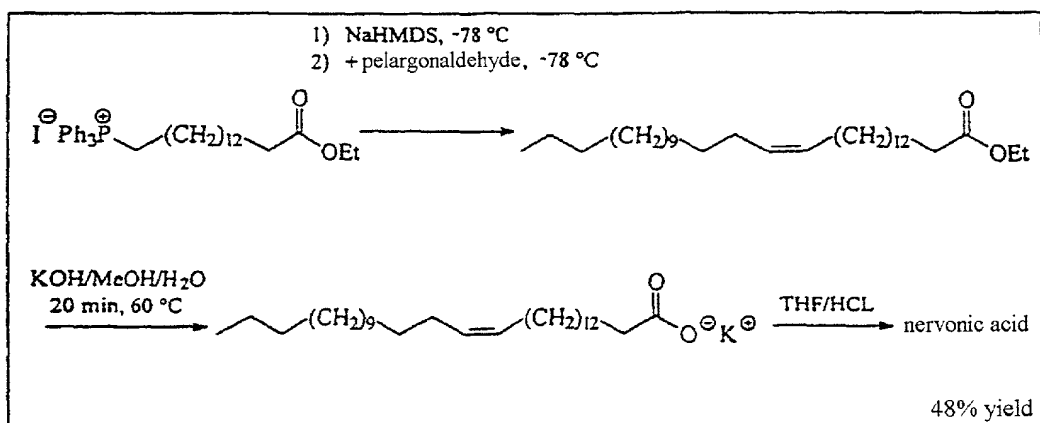
The (Z)-alkenols and the monounsaturated (Z)-fatty acids are synthesized by stereoselective Wittig reaction of an  $\omega$ -substitued aldehyde with an unsubstituted phosphonium salt and by reaction of an  $\omega$ -substitued phosphonium salt with an unsubstituted aldehyde, respectively.

15 Unsubstituted aldehydes with a purity of more 97% are commercially available chemicals up to a chain length of 12 carbon atoms (dodecanal) and can be employed directly in the Wittig reaction. Longer-chain aldehydes can be obtained from purchasable fatty alcohols by

20 Swern or Kornblum oxidation. Unsubstituted alkyl halides (mainly bromides and chlorides) are used to prepare simple phosphonium bromides, it being possible to purchase alkyl halides in a purity of more than 97%. Reference is made in example 1 and 2 to the synthesis

25 of  $\omega$ -substitued Wittig precursors. The generation of ylide solutions from phosphonium iodides is simpler because the deprotonation starts even at relatively low temperatures, and there is thus no need to heat the reaction mixture. The fatty acids can in some cases be

30 obtained in good purity without chromatographic purification by precipitating their potassium salts.



### Nervonic acid synthesis

- 5 Unsaturated fatty acids can be converted into the corresponding fatty alcohols using lithium aluminum hydride by processes described in the literature.

#### (Z)-Stereoselective Wittig reaction of an $\omega$ -substituted phosphonium bromide

##### (Z)-10-Docosen-1-ol

- 86.7 g (160 mmol) of [10-(acetoxyl)decyl]triphenylphosphonium bromide were introduced into 400 ml of dry THF. Under an argon atmosphere, 200 ml of sodium bis(trimethylsilyl)amide (1M in THF) were slowly injected into the reaction solution. Stirring (glass stirrer) at room temperature for 30 minutes was followed by heating under reflux for one hour. The ylide solution was then cooled firstly to 10°C and then to -78°C and, after stirring at this temperature for 30 minutes. 30.0 g (163 mmol) of lauraldehyde in 50 ml of THF were slowly added dropwise. The mixture was stirred for a further 30 minutes and then allowed to warm to room temperature overnight.

#### Workup

- The reaction mixture was mixed with 600 ml of water and 200 ml of diethyl ether, the phases were separated, and the solvent was removed from the organic phase in vacuo. For the hydrolysis, a solution of 25 g of

potassium hydroxide in 10 ml of water/200 ml of methanol was added, and the mixture was stirred at 60°C for 20 minutes. The reaction solution was mixed with 600 ml of water and extracted with 300 ml of diethyl ether. After the organic phase had been washed with 500 ml of saturated NaHCO<sub>3</sub> solution and 500 ml of water, the solvent was distilled off in vacuo. The crude product was purified by column chromatography (cyclohexane/diisopropyl ether: gradual increase in the polarity from 19:1 to 1:1) on 550 g of silica gel. The compound was precipitated from acetone at -20°C. Drying in a desiccator for several days resulted in 26.8 g (82.6 mmol, 52%) of the long-chain fatty alcohol.

<sup>1</sup>H-NMR (300 MHz, CDCl<sub>3</sub>):  $\delta$  = 0.88 (t, <sup>3</sup>J = 6.6 Hz, 3H, alkyl-CH<sub>3</sub>), 1.23-1.30 (m, 30H, -CH<sub>2</sub>-), 1.56 (mc, 2H, CH<sub>2</sub>CH<sub>2</sub>OH), 2.00 (m, 4H, allyl-H), 3.64 (t, <sup>3</sup>J = 6.2 Hz, 2H, CH<sub>2</sub>OH), 5.35 (t, <sup>3</sup>J<sub>cis</sub> = 3.8 Hz, 2H, -CH=CH-cis)

IR (KBr):  $\nu$ [cm<sup>-1</sup>] = 3366 (m), 2998 (m), 2918 (s), 2848 (s), 1459 (m), 1366 (w), 1067 (m), 724 (m), 688 (w), 580 (w)

MW (C<sub>22</sub>H<sub>44</sub>O) = 324.59 g/mol

Analysis:	C	H
Calculated	81.41	13.66
Found	81.56	13.72

#### Stereoselective Wittig reaction of an $\omega$ -substituted phosphonium iodide

*(Z)*-15-Tetracosenoic acid (*nervonic acid*)

197.4 g (300 mmol) of the appropriate phosphonium salt were introduced into 1100 ml of dry THF under an inert gas atmosphere. After cooling to -78°C, 360 ml of sodium bis(trimethylsilyl)amide (1M in THF) were slowly added dropwise to the reaction solution while stirring (glass stirrer). After stirring at this temperature for 30 minutes, a solution of 47.0 g (330 mmol) of pelargonaldehyde in 50 ml of THF was added dropwise over a period of 40 minutes; after stirring vigorously

## Workup

The crude product was purified by column chromatography  
25 on 1100 g of silica gel. The apolar impurity was eluted  
first with cyclohexane/diisopropyl ether (19:1).  
Chromatography with cyclohexane/diisopropyl ether (1:1)  
afforded the product.

MW = 366.63 g/mol ( $C_{24}H_{46}O_2$ )

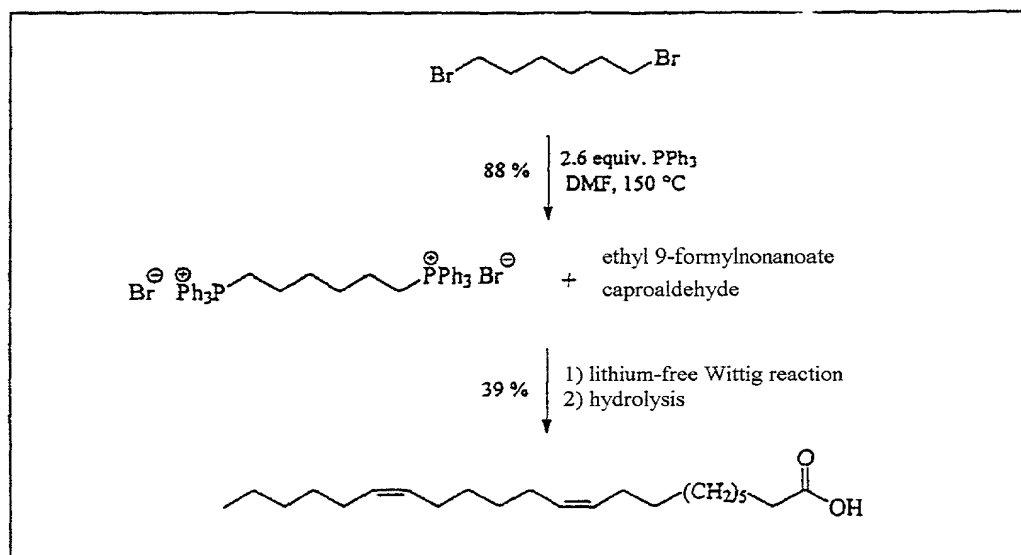
Melting point: 41.1°C (Lit. 42-43°C)

It is also possible to prepare monounsaturated (Z)-alkenols and (Z)-fatty acids by reacting  $\omega$ -substituted aldehydes with saturated phosphonium salts by the processes described above.

Terminally unsaturated alkadienecarboxylic acids are obtained by (Z)-selective Wittig reaction of a terminally unsaturated aldehyde with an  $\omega$ -substituted phosphonium salt (for example 10-undecenal).

#### Example 4

Reaction of  $\alpha,\omega$ -dibromoalkanes at both ends with triphenylphosphane results in  $\alpha,\omega$ -bis(triphenylphosphonio)alkane dibromides. After conversion into the bisphosphorane, stereospecific conversion into an olefin takes place under salt-free conditions with a solution of a substituted and an unsubstituted aldehyde. Alkaline hydrolysis of the resulting ester affords, depending on the aldehyde used, (Z,Z)-alkadienols or (Z,Z)-fatty acids.



Lithium salt-free crossed Wittig reaction of a bisphosphonium salt with an unsubstituted and with an

$\omega$ -substituted aldehyde: synthesis of (Z,Z)-10,16-docosadien-1-ol

Synthesis of an  $\alpha,\omega$ -bis(triphenylphosphonio)alkane dibromide

*1,6-Bis(triphenylphosphonio)hexane dibromide (62)*

122.2 g (0.50 mol) of 1,6-dibromohexane were dissolved together with 341.7 g (1.30 mol) of triphenylphosphane in 1500 ml of DMF. The reaction mixture was heated under reflux with stirring (glass stirrer) for 4 hours. It was allowed to cool to room temperature. The product was filtered off with suction and washed with 2 x 250 ml of acetone and 200 ml of diethyl ether. Drying in vacuo for several days resulted in 336.5 g (0.44 mol, 88%) of the crystalline bisphosphonium salt.

MW = 768.55 g/mol ( $C_{42}H_{42}Br_2P_2$ )

$R_f$  = 0.26 (chloroform/methanol, 9:1)

Analysis:	C	H	P
Calculated	66.64	5.51	8.06
Found	65.77	5.59	7.98

Crossed Wittig reaction

*(Z,Z)-10,16-Docosadienoic acid*

76.9 g (100 mmol) of 1,6-bis(triphenylphosphonio)hexane dibromide were suspended in 500 ml of THF. 240 ml (240 mmol) of sodium bis(trimethylsilyl)amide (1M in THF) were injected through a septum under an inert gas atmosphere. The ylide solution was stirred at room temperature for 30 minutes and then under reflux for 1 hour. After it had been cooled to  $-78^\circ\text{C}$ , a solution of 21.5 g (100 mmol) of ethyl 9-formylnonanoate and 10.1 g (101 mmol) of caproaldehyde in 50 ml of THF was added dropwise over the course of 30 minutes. The mixture was stirred for a further 30 minutes and then allowed to warm to room temperature overnight.

50 ml of water were added to the reaction mixture, and then the solvent was removed in vacuo. A solution of



25 g of potassium hydroxide in 10 ml of water/200 ml of methanol were added, and the reaction solution was stirred at 60°C for 20 minutes. It was then dried azeotropically by addition of toluene and distillation in vacuo. The residue was heated with 1.5 l of acetone while stirring vigorously at 60°C for 10 minutes. The potassium salt which precipitated during this was filtered off with suction and washed several times with acetone. The product was dissolved off the filter using a solution of 600 ml of THF/150 ml of concentrated hydrochloric acid. The resulting two-phase mixture was mixed with 500 ml of diisopropyl ether, and the phases were separated. The organic phase was washed three times with 500 ml of water each time and dried over sodium sulfate, and the solvent was distilled off in vacuo.

The crude product was purified by column chromatography (cyclohexane/diisopropyl ether; gradual increase in the polarity from 4:1 to 1:1) on 400 g of silica gel. 13.0 g (38.6 mmol, 39%) of the diunsaturated fatty acid were obtained.

MW = 336.56 g/mol ( $C_{22}H_{40}O_2$ )

$R_f$  = 0.35 (cyclohexane/diisopropyl ether, 1:1)

25	Analysis:	C	H
	Calculated	78.51	11.98
	Found	78.30	11.92

$^1H$ -NMR (300 MHz,  $CDCl_3$ ):  $\delta$  = 0.89 (t,  $^3J$  = 6.8 Hz, 3H, -CH<sub>3</sub>), 1.30-1.43 (m, 20H, 10 × CH<sub>2</sub>), 1.63 (mc, 2H, CH<sub>2</sub>CH<sub>2</sub>COOH), 2.03 (bs, 8H, allyl-H), 2.35 (t,  $^3J$  = 7.5 Hz, 2H, CH<sub>2</sub>COOH), 5.34 (mc, 4H, -CH=CH-cis)

**Example 5**

Comparison of the known antitumor active ingredient erucylphosphocholine with active ingredients of the invention

5

Comparison of a compound not of the invention (erucylphosphocholine) with two active ingredients of the invention is shown in Table 1.

10

Table 1

Alkylphosphocholine	Weekly dose [ $\mu\text{mol/kg}$ ]	T/C [%] *
Erucylphosphocholine (data taken from Kaufmann-Kolle et al. 1996)	90	31
	180	6
	360	< 0.1
(Z)-10-Docosenyl-1-PC	42	9
	170	0.5
	256	0.2
(Z)-11,21-Docosadienyl-1-PC	42	8
	170	2

15

Table 1: \* Quotient of the median tumor volume in the treated and the control group  $\times 100$ . Evaluation after therapy for 5 weeks.

20

After the lack of activity of a (Z,Z)-alkadienylphosphocholine with methylene-interrupted double bonds and based on the  $\text{C}_{18}$  chain had been demonstrated, it was possible to restore the activity of the class of substances by extending the alkadienyl chain and isolating the double bonds more markedly from one another (table 2).

Table 2

Unsaturated alkylphosphocholine	Dose [ $\mu\text{mol/kg}$ ]	Median tumor volume [ $\text{cm}^3$ ]	
		End of therapy	2 weeks later
(Z)-12-Heneicosenyl- 1-phosphocholine	42	3.4	4.5
	84	0.3	1.2
	170	0.1	0.1
	256	0.2	0.8
(Z)-10-Docosenyl-1- phosphocholine (double bond in $\omega$ -12 position)	42	4.0	4.5
	84	1.2	3.4
	170	0.2	0.2
	256	0.1	0.2
(Z)-16-Docosenyl-1- phosphocholine (double bond in $\omega$ -6 position)	42	26.9	--
	84	2.5	7.6
	170	0.2	0.4
(Z,Z)-6,12-Eicosadi- enyl-1-PC	42	10	13.9
	84	3.2	13.9
	170	0.4	1.9
	256	0	0
(Z)-11,21-Docosa- dienyl-1-PC	42	1.5	2.5
	84	0.9	2.9
	170	0.4	0.5
(Z,Z)-10,16-Docosa- dienyl-1-PC	42	7.5	11.4
	84	0.6	0.6
	170	0.5	0.7

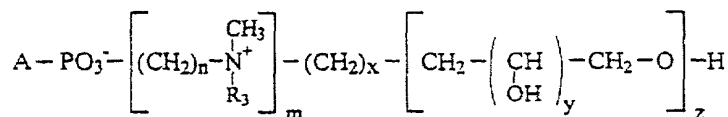
**Example 6: Exemplary compounds**

The R<sub>f</sub> values of the exemplary compounds were determined in the system CHCl<sub>3</sub>/CH<sub>3</sub>OH/glacial acetic acid/H<sub>2</sub>O: 100/60/20/5 (proportions by volume). They are  
5 grouped very closely together, specifically as follows:

R <sub>f</sub>	Compounds Nos.
0.10-0.15	1454-1496
0.15-0.20	1399 - 1453; 1543 - 1555
0.20-0.25	1320 - 1398; 1523 - 1542; 1752-1812
0.25-0.30	1497 - 1522; 1691 - 1751
0.30-0.35	1083 - 1319; 1556 - 1568; 1630 - 1690
0.35-0.40	1569 - 1629
0.40-0.45	1813 - 1839
0.30-0.40	1 - 1082

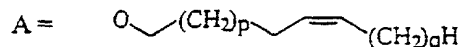
**1. Examples of (Z)-alkenylphosphocholines**

(A = VIII; n = 2; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1, z = 0)



10

where A is a monounsaturated alkyl chain of the following structure (p, q ≥ 0; 12 ≤ p+q ≤ 30):



formula VIII

**16 chain carbon atoms**

C<sub>21</sub>H<sub>44</sub>NO<sub>4</sub>P (405.56)

1. (Z)-3-hexadecenyl-1-phosphocholine
2. (Z)-4-hexadecenyl-1-phosphocholine
3. (Z)-5-hexadecenyl-1-phosphocholine
4. (Z)-6-hexadecenyl-1-phosphocholine
5. (Z)-8-hexadecenyl-1-phosphocholine
6. (Z)-9-hexadecenyl-1-phosphocholine

7. (Z)-10-hexadecenyl-1-phosphocholine
8. (Z)-11-hexadecenyl-1-phosphocholine
9. (Z)-12-hexadecenyl-1-phosphocholine
10. (Z)-13-hexadecenyl-1-phosphocholine
11. (Z)-14-hexadecenyl-1-phosphocholine
12. 15-hexadecenyl-1-phosphocholine

#### 17 chain carbon atoms

$C_{22}H_{46}NO_4P$  (419.59)

13. (Z)-3-heptadecenyl-1-phosphocholine
14. (Z)-4-heptadecenyl-1-phosphocholine
15. (Z)-5-heptadecenyl-1-phosphocholine
16. (Z)-6-heptadecenyl-1-phosphocholine
17. (Z)-7-heptadecenyl-1-phosphocholine
18. (Z)-8-heptadecenyl-1-phosphocholine
19. (Z)-9-heptadecenyl-1-phosphocholine
20. (Z)-10-heptadecenyl-1-phosphocholine
21. (Z)-11-heptadecenyl-1-phosphocholine
22. (Z)-12-heptadecenyl-1-phosphocholine
23. (Z)-13-heptadecenyl-1-phosphocholine
24. (Z)-14-heptadecenyl-1-phosphocholine
25. (Z)-15-heptadecenyl-1-phosphocholine
26. 16-heptadecenyl-1-phosphocholine

#### 18 chain carbon atoms

$C_{23}H_{48}NO_4P$  (433.61)

27. (Z)-3-octadecenyl-1-phosphocholine
28. (Z)-4-octadecenyl-1-phosphocholine
29. (Z)-5-octadecenyl-1-phosphocholine
30. (Z)-6-octadecenyl-1-phosphocholine
31. (Z)-7-octadecenyl-1-phosphocholine
32. (Z)-8-octadecenyl-1-phosphocholine
33. (Z)-10-octadecenyl-1-phosphocholine
34. (Z)-11-octadecenyl-1-phosphocholine

35. (Z)-12-octadecenyl-1-phosphocholine
36. (Z)-13-octadecenyl-1-phosphocholine
37. (Z)-14-octadecenyl-1-phosphocholine
38. (Z)-15-octadecenyl-1-phosphocholine
39. (Z)-16-octadecenyl-1-phosphocholine
40. 17-octadecenyl-1-phosphocholine

#### 19 chain carbon atoms

$C_{24}H_{50}NO_4P$  (447.64)

41. (Z)-3-nonadecenyl-1-phosphocholine
42. (Z)-4-nonadecenyl-1-phosphocholine
43. (Z)-5-nonadecenyl-1-phosphocholine
44. (Z)-6-nonadecenyl-1-phosphocholine
45. (Z)-7-nonadecenyl-1-phosphocholine
46. (Z)-8-nonadecenyl-1-phosphocholine
47. (Z)-9-nonadecenyl-1-phosphocholine
48. (Z)-10-nonadecenyl-1-phosphocholine
49. (Z)-11-nonadecenyl-1-phosphocholine
50. (Z)-12-nonadecenyl-1-phosphocholine
51. (Z)-13-nonadecenyl-1-phosphocholine
52. (Z)-14-nonadecenyl-1-phosphocholine
53. (Z)-15-nonadecenyl-1-phosphocholine
54. (Z)-16-nonadecenyl-1-phosphocholine
55. (Z)-17-nonadecenyl-1-phosphocholine
56. 18-nonadecenyl-1-phosphocholine

#### 20 chain carbon atoms

$C_{25}H_{52}NO_4P$  (461.67)

57. (Z)-3-eicosenyl-1-phosphocholine
58. (Z)-4-eicosenyl-1-phosphocholine
59. (Z)-5-eicosenyl-1-phosphocholine
60. (Z)-6-eicosenyl-1-phosphocholine
61. (Z)-7-eicosenyl-1-phosphocholine
62. (Z)-8-eicosenyl-1-phosphocholine

63. (Z)-9-eicosenyl-1-phosphocholine
64. (Z)-10-eicosenyl-1-phosphocholine
65. (Z)-12-eicosenyl-1-phosphocholine
66. (Z)-13-eicosenyl-1-phosphocholine
67. (Z)-14-eicosenyl-1-phosphocholine
68. (Z)-15-eicosenyl-1-phosphocholine
69. (Z)-16-eicosenyl-1-phosphocholine
70. (Z)-17-eicosenyl-1-phosphocholine
71. (Z)-18-eicosenyl-1-phosphocholine
72. 19-eicosenyl-1-phosphocholine

### 21 chain carbon atoms

$C_{26}H_{54}NO_4P$  (475.69)

73. (Z)-3-heneicosenyl-1-phosphocholine
74. (Z)-4-heneicosenyl-1-phosphocholine
75. (Z)-5-heneicosenyl-1-phosphocholine
76. (Z)-6-heneicosenyl-1-phosphocholine
77. (Z)-7-heneicosenyl-1-phosphocholine
78. (Z)-8-heneicosenyl-1-phosphocholine
79. (Z)-9-heneicosenyl-1-phosphocholine
80. (Z)-10-heneicosenyl-1-phosphocholine
81. (Z)-11-heneicosenyl-1-phosphocholine
82. (Z)-12-heneicosenyl-1-phosphocholine
83. (Z)-13-heneicosenyl-1-phosphocholine
84. (Z)-14-heneicosenyl-1-phosphocholine
85. (Z)-15-heneicosenyl-1-phosphocholine
86. (Z)-16-heneicosenyl-1-phosphocholine
87. (Z)-17-heneicosenyl-1-phosphocholine
88. (Z)-18-heneicosenyl-1-phosphocholine
89. (Z)-19-heneicosenyl-1-phosphocholine
90. 20-heneicosenyl-1-phosphocholine

22 chain carbon atoms $C_{27}H_{56}NO_4P$  (489.72)

91. (Z)-3-docosenyl-1-phosphocholine
92. (Z)-4-docosenyl-1-phosphocholine
93. (Z)-5-docosenyl-1-phosphocholine
94. (Z)-6-docosenyl-1-phosphocholine
95. (Z)-7-docosenyl-1-phosphocholine
96. (Z)-8-docosenyl-1-phosphocholine
97. (Z)-9-docosenyl-1-phosphocholine
98. (Z)-10-docosenyl-1-phosphocholine
99. (Z)-11-docosenyl-1-phosphocholine
100. (Z)-12-docosenyl-1-phosphocholine
101. (Z)-14-docosenyl-1-phosphocholine
102. (Z)-15-docosenyl-1-phosphocholine
103. (Z)-16-docosenyl-1-phosphocholine
104. (Z)-17-docosenyl-1-phosphocholine
105. (Z)-18-docosenyl-1-phosphocholine
106. (Z)-19-docosenyl-1-phosphocholine
107. (Z)-20-docosenyl-1-phosphocholine
108. 21-docosenyl-1-phosphocholine

23 chain carbon atoms $C_{28}H_{58}NO_4P$  (503.75)

109. (Z)-3-tricosenyl-1-phosphocholine
110. (Z)-4-tricosenyl-1-phosphocholine
111. (Z)-5-tricosenyl-1-phosphocholine
112. (Z)-6-tricosenyl-1-phosphocholine
113. (Z)-7-tricosenyl-1-phosphocholine
114. (Z)-8-tricosenyl-1-phosphocholine
115. (Z)-9-tricosenyl-1-phosphocholine
116. (Z)-10-tricosenyl-1-phosphocholine
117. (Z)-11-tricosenyl-1-phosphocholine
118. (Z)-12-tricosenyl-1-phosphocholine
119. (Z)-13-tricosenyl-1-phosphocholine



- 120. (Z)-14-tricosenyl-1-phosphocholine
- 121. (Z)-15-tricosenyl-1-phosphocholine
- 122. (Z)-16-tricosenyl-1-phosphocholine
- 123. (Z)-17-tricosenyl-1-phosphocholine
- 124. (Z)-18-tricosenyl-1-phosphocholine
- 125. (Z)-19-tricosenyl-1-phosphocholine
- 126. (Z)-20-tricosenyl-1-phosphocholine
- 127. (Z)-21-tricosenyl-1-phosphocholine
- 128. 22-tricosenyl-1-phosphocholine

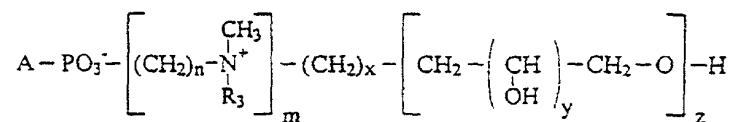
#### 24 chain carbon atoms

C<sub>29</sub>H<sub>60</sub>NO<sub>4</sub>P (517.77)

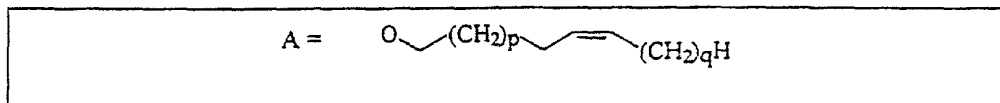
- 129. (Z)-3-tetracosenyl-1-phosphocholine
- 130. (Z)-4-tetracosenyl-1-phosphocholine
- 131. (Z)-5-tetracosenyl-1-phosphocholine
- 132. (Z)-6-tetracosenyl-1-phosphocholine
- 133. (Z)-7-tetracosenyl-1-phosphocholine
- 134. (Z)-8-tetracosenyl-1-phosphocholine
- 135. (Z)-9-tetracosenyl-1-phosphocholine
- 136. (Z)-10-tetracosenyl-1-phosphocholine
- 137. (Z)-11-tetracosenyl-1-phosphocholine
- 138. (Z)-12-tetracosenyl-1-phosphocholine
- 139. (Z)-13-tetracosenyl-1-phosphocholine
- 140. (Z)-14-tetracosenyl-1-phosphocholine
- 141. (Z)-16-tetracosenyl-1-phosphocholine
- 142. (Z)-17-tetracosenyl-1-phosphocholine
- 143. (Z)-18-tetracosenyl-1-phosphocholine

#### 2. Examples of (Z)-alkenyl-1-phospho-N,N,N-trimethyl-propylammonium compounds

(A = VIII; n = 3; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)



where A is a monounsaturated alkyl chain of the following structure ( $p, q \geq 0$ ;  $12 \leq p+q \leq 30$ ):



formula VIII

16 chain carbon atoms

$\text{C}_{22}\text{H}_{46}\text{NO}_4\text{P}$  (419.59)

144. (Z)-3-hexadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
145. (Z)-4-hexadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
146. (Z)-5-hexadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
147. (Z)-6-hexadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
148. (Z)-7-hexadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
149. (Z)-8-hexadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
150. (Z)-9-hexadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
151. (Z)-10-hexadecenyl-1-phospho-N,N,N-trimethylpropylammonium
152. (Z)-11-hexadecenyl-1-phospho-N,N,N-trimethylpropylammonium
153. (Z)-12-hexadecenyl-1-phospho-N,N,N-trimethylpropylammonium
154. (Z)-13-hexadecenyl-1-phospho-N,N,N-trimethylpropylammonium
155. (Z)-14-hexadecenyl-1-phospho-N,N,N-trimethylpropylammonium
156. 15-hexadecenyl-1-phospho-N,N,N-trimethylpropylammonium

17 chain carbon atoms $C_{23}H_{48}NO_4P$  (433.61)

157. (Z)-3-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
158. (Z)-4-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
159. (Z)-5-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
160. (Z)-6-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
161. (Z)-7-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
162. (Z)-8-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
163. (Z)-9-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
164. (Z)-10-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
165. (Z)-11-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
166. (Z)-12-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
167. (Z)-13-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
168. (Z)-14-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
169. (Z)-15-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
170. 16-heptadecenyl-1-phospho-N,N,N-trimethyl-propylammonium

18 chain carbon atoms

$C_{24}H_{50}NO_4P$  (447.64)

171. (Z)-3-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
172. (Z)-4-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
173. (Z)-5-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
174. (Z)-6-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
175. (Z)-7-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
176. (Z)-8-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
177. (Z)-10-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
178. (Z)-11-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
179. (Z)-12-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
180. (Z)-13-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
181. (Z)-14-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
182. (Z)-15-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
183. (Z)-16-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
184. 17-octadecenyl-1-phospho-N,N,N-trimethyl-propylammonium

19 chain carbon atoms $C_{25}H_{52}NO_4P$  (461.67)

185. (Z)-3-nonadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
186. (Z)-4-nonadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
187. (Z)-5-nonadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
188. (Z)-6-nonadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
189. (Z)-7-nonadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
190. (Z)-8-nonadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
191. (Z)-9-nonadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
192. (Z)-10-nonadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
193. (Z)-11-nonadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
194. (Z)-12-nonadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
195. (Z)-13-nonadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
196. (Z)-14-nonadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
197. (Z)-15-nonadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
198. (Z)-16-nonadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
199. (Z)-17-nonadecenyl-1-phospho-N,N,N-trimethyl-propylammonium
200. 18-nonadecenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

20 chain carbon atoms

$C_{26}H_{54}NO_4P$  (475.69)

201. (Z)-3-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
202. (Z)-4-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
203. (Z)-5-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
204. (Z)-6-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
205. (Z)-7-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
206. (Z)-8-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
207. (Z)-9-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
208. (Z)-10-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
209. (Z)-12-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
210. (Z)-13-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
211. (Z)-14-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
212. (Z)-15-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
213. (Z)-16-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
214. (Z)-17-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
215. (Z)-18-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
216. 19-eicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

21 chain carbon atoms

C<sub>27</sub>H<sub>56</sub>NO<sub>4</sub>P (489.72)

217. (Z)-3-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
218. (Z)-4-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
219. (Z)-5-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
220. (Z)-6-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
221. (Z)-7-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
222. (Z)-8-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
223. (Z)-9-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
224. (Z)-10-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
225. (Z)-11-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
226. (Z)-12-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
227. (Z)-13-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
228. (Z)-14-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
229. (Z)-15-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
230. (Z)-16-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
231. (Z)-17-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
232. (Z)-18-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium
233. (Z)-19-heneicosenyl-1-phospho-N,N,N-trimethyl-propylammonium

234. 20-heneicosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

22 chain carbon atoms

C<sub>28</sub>H<sub>58</sub>NO<sub>4</sub>P (503.75)

235. (Z)-3-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

236. (Z)-4-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

237. (Z)-5-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

238. (Z)-6-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

239. (Z)-7-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

240. (Z)-8-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

241. (Z)-9-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

242. (Z)-10-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

243. (Z)-11-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

244. (Z)-12-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

245. (Z)-14-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

246. (Z)-15-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

247. (Z)-16-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

248. (Z)-17-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

249. (Z)-18-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium



250. (Z)-19-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
251. (Z)-20-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
252. 21-docosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

### 23 chain carbon atoms

C<sub>29</sub>H<sub>60</sub>NO<sub>4</sub>P (517.77)

253. (Z)-3-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
254. (Z)-4-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
255. (Z)-5-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
256. (Z)-6-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
257. (Z)-7-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
258. (Z)-8-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
259. (Z)-9-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
260. (Z)-10-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
261. (Z)-11-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
262. (Z)-12-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
263. (Z)-13-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
264. (Z)-14-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
265. (Z)-15-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

266. (Z)-16-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
267. (Z)-17-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
268. (Z)-18-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
269. (Z)-19-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
270. (Z)-20-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
271. (Z)-21-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium
272. 22-tricosenyl-1-phospho-N,N,N-trimethylpropyl-ammonium

#### 24 chain carbon atoms

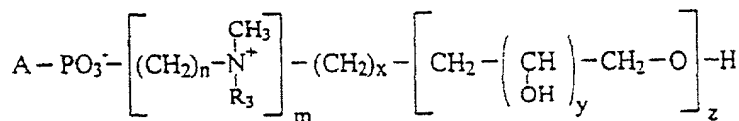
$C_{30}H_{62}NO_4P$  (531.80)

273. (Z)-3-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
274. (Z)-4-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
275. (Z)-5-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
276. (Z)-6-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
277. (Z)-7-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
278. (Z)-8-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
279. (Z)-9-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
280. (Z)-10-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
281. (Z)-11-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium

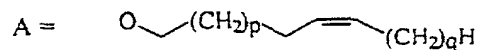
282. (Z)-12-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
283. (Z)-13-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
284. (Z)-14-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
285. (Z)-15-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
286. (Z)-16-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
287. (Z)-17-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium
288. (Z)-18-tetracosenyl-1-phospho-N,N,N-trimethyl-propylammonium

**3. Examples of (Z)-alkenyl-1-phospho-N,N,N-trimethyl-butylammonium compounds**

(A = VIII; n = 4; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)



where A is a monounsaturated alkyl chain of the following structure (p, q ≥ 0; 12 ≤ p+q ≤ 30):



formula VIII

**16 chain carbon atoms**

C<sub>23</sub>H<sub>48</sub>NO<sub>4</sub>P (433.61)

289. (Z)-3-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
290. (Z)-4-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

291. (Z)-5-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
292. (Z)-6-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
293. (Z)-7-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
294. (Z)-8-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
295. (Z)-9-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
296. (Z)-10-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
297. (Z)-11-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
298. (Z)-12-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
299. (Z)-13-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
300. (Z)-14-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
301. 15-hexadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

#### 17 chain carbon atoms

$C_{24}H_{50}NO_4P$  (447.64)

302. (Z)-3-heptadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
303. (Z)-4-heptadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
304. (Z)-5-heptadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
305. (Z)-6-heptadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
306. (Z)-7-heptadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

307. (Z)-8-heptadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
308. (Z)-9-heptadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
309. (Z)-10-heptadecenyl-1-phospho-N,N,N-trimethylbutylammonium
310. (Z)-11-heptadecenyl-1-phospho-N,N,N-trimethylbutylammonium
311. (Z)-12-heptadecenyl-1-phospho-N,N,N-trimethylbutylammonium
312. (Z)-13-heptadecenyl-1-phospho-N,N,N-trimethylbutylammonium
313. (Z)-14-heptadecenyl-1-phospho-N,N,N-trimethylbutylammonium
314. (Z)-15-heptadecenyl-1-phospho-N,N,N-trimethylbutylammonium
315. 16-heptadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

#### 18 chain carbon atoms

$C_{25}H_{52}NO_4P$  (461.67)

316. (Z)-3-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
317. (Z)-4-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
318. (Z)-5-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
319. (Z)-6-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
320. (Z)-7-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
321. (Z)-8-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
322. (Z)-10-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

323. (Z)-11-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
324. (Z)-12-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
325. (Z)-13-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
326. (Z)-14-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
327. (Z)-15-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
328. (Z)-16-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
329. 17-octadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

#### 19 chain carbon atoms

$C_{26}H_{54}NO_4P$  (475.69)

330. (Z)-3-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
331. (Z)-4-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
332. (Z)-5-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
333. (Z)-6-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
334. (Z)-7-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
335. (Z)-8-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
336. (Z)-9-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
337. (Z)-10-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
338. (Z)-11-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

339. (Z)-12-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
340. (Z)-13-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
341. (Z)-14-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
342. (Z)-15-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
343. (Z)-16-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
344. (Z)-17-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
345. 18-nonadecenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

#### 20 chain carbon atoms

$C_{27}H_{56}NO_4P$  (489.72)

346. (Z)-3-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
347. (Z)-4-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
348. (Z)-5-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
349. (Z)-6-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
350. (Z)-7-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
351. (Z)-8-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
352. (Z)-9-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
353. (Z)-10-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
354. (Z)-11-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

355. (Z)-12-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
356. (Z)-13-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
357. (Z)-14-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
358. (Z)-15-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
359. (Z)-16-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
360. (Z)-17-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
361. (Z)-18-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
362. 19-eicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

#### 21 chain carbon atoms

$C_{28}H_{58}NO_4P$  (503.75)

363. (Z)-3-heneicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
364. (Z)-4-heneicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
365. (Z)-5-heneicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
366. (Z)-6-heneicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
367. (Z)-7-heneicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
368. (Z)-8-heneicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
369. (Z)-9-heneicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
370. (Z)-10-heneicosenyl-1-phospho-N,N,N-trimethylbutylammonium



371. (Z)-11-heneicosenyl-1-phospho-N,N,N-trimethyl-butylammonium
372. (Z)-12-heneicosenyl-1-phospho-N,N,N-trimethyl-butylammonium
373. (Z)-13-heneicosenyl-1-phospho-N,N,N-trimethyl-butylammonium
374. (Z)-14-heneicosenyl-1-phospho-N,N,N-trimethyl-butylammonium
375. (Z)-15-heneicosenyl-1-phospho-N,N,N-trimethyl-butylammonium
376. (Z)-16-heneicosenyl-1-phospho-N,N,N-trimethyl-butylammonium
377. (Z)-17-heneicosenyl-1-phospho-N,N,N-trimethyl-butylammonium
378. (Z)-18-heneicosenyl-1-phospho-N,N,N-trimethyl-butylammonium
379. (Z)-19-heneicosenyl-1-phospho-N,N,N-trimethyl-butylammonium
380. 20-heneicosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

### 22 chain carbon atoms

C<sub>29</sub>H<sub>60</sub>NO<sub>4</sub>P (517.77)

381. (Z)-3-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
382. (Z)-4-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
383. (Z)-5-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
384. (Z)-6-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
385. (Z)-7-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
386. (Z)-8-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

387. (Z)-9-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
388. (Z)-10-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
389. (Z)-11-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
390. (Z)-12-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
391. (Z)-14-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
392. (Z)-15-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
393. (Z)-16-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
394. (Z)-17-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
395. (Z)-18-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
396. (Z)-19-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
397. (Z)-20-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
398. 21-docosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

### 23 chain carbon atoms

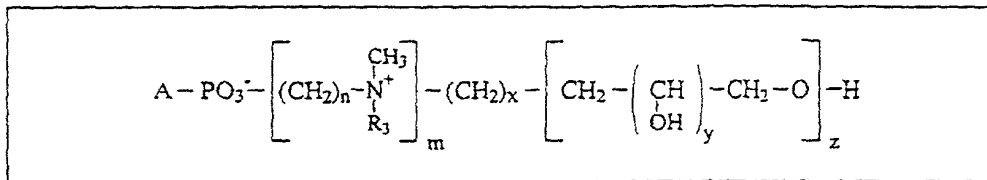
$C_{30}H_{62}NO_4P$  (531.80)

399. (Z)-3-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
400. (Z)-4-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
401. (Z)-5-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
402. (Z)-6-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

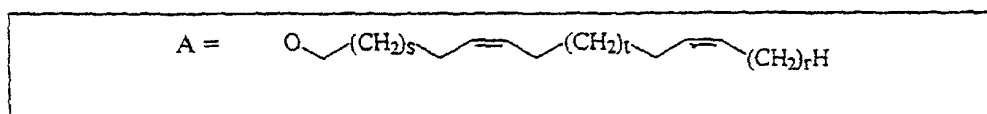
403. (Z)-7-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
404. (Z)-8-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
405. (Z)-9-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
406. (Z)-10-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
407. (Z)-11-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
408. (Z)-12-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
409. (Z)-13-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
410. (Z)-14-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
411. (Z)-15-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
412. (Z)-16-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
413. (Z)-17-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
414. (Z)-18-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
415. (Z)-19-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
416. (Z)-20-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
417. (Z)-21-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
418. 22-tricosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium

24 chain carbon atoms $C_{31}H_{64}NO_4P$  (545.83)

419. (Z)-3-tetracosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
420. (Z)-4-tetracosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
421. (Z)-5-tetracosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
422. (Z)-6-tetracosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
423. (Z)-7-tetracosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
424. (Z)-8-tetracosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
425. (Z)-9-tetracosenyl-1-phospho-N,N,N-trimethylbutyl-ammonium
426. (Z)-10-tetracosenyl-1-phospho-N,N,N-trimethyl-butylammonium
427. (Z)-11-tetracosenyl-1-phospho-N,N,N-trimethyl-butylammonium
428. (Z)-12-tetracosenyl-1-phospho-N,N,N-trimethyl-butylammonium
429. (Z)-13-tetracosenyl-1-phospho-N,N,N-trimethyl-butylammonium
430. (Z)-14-tetracosenyl-1-phospho-N,N,N-trimethyl-butylammonium
431. (Z)-15-tetracosenyl-1-phospho-N,N,N-trimethyl-butylammonium
432. (Z)-16-tetracosenyl-1-phospho-N,N,N-trimethyl-butylammonium
433. (Z)-17-tetracosenyl-1-phospho-N,N,N-trimethyl-butylammonium
434. (Z)-18-tetracosenyl-1-phospho-N,N,N-trimethyl-butylammonium

4. Examples of (Z,Z)-alkadienylphosphocholines(A = IX; n = 2; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1, z = 0)

where A is a diunsaturated alkyl chain of the following structure (s, t, r ≥ 0; 8 ≤ s + t + r ≤ 26):



formula IX

16 chain carbon atomsC<sub>21</sub>H<sub>42</sub>NO<sub>4</sub>P (403.54)

- 435. (Z,Z)-3,7-hexadecadienyl-1-phosphocholine
- 436. (Z,Z)-4,8-hexadecadienyl-1-phosphocholine
- 437. (Z,Z)-5,9-hexadecadienyl-1-phosphocholine
- 438. (Z,Z)-6,10-hexadecadienyl-1-phosphocholine
- 439. (Z,Z)-7,11-hexadecadienyl-1-phosphocholine
- 440. (Z,Z)-8,12-hexadecadienyl-1-phosphocholine
- 441. (Z,Z)-9,13-hexadecadienyl-1-phosphocholine
  
- 442. (Z,Z)-3,8-hexadecadienyl-1-phosphocholine
- 443. (Z,Z)-4,9-hexadecadienyl-1-phosphocholine
- 444. (Z,Z)-5,10-hexadecadienyl-1-phosphocholine
- 445. (Z,Z)-6,11-hexadecadienyl-1-phosphocholine
- 446. (Z,Z)-7,12-hexadecadienyl-1-phosphocholine
- 447. (Z,Z)-8,13-hexadecadienyl-1-phosphocholine
  
- 448. (Z,Z)-3,9-hexadecadienyl-1-phosphocholine
- 449. (Z,Z)-4,10-hexadecadienyl-1-phosphocholine
- 450. (Z,Z)-5,11-hexadecadienyl-1-phosphocholine
- 451. (Z,Z)-6,12-hexadecadienyl-1-phosphocholine
- 452. (Z,Z)-7,13-hexadecadienyl-1-phosphocholine

453. (Z,Z)-3,10-hexadecadienyl-1-phosphocholine  
454. (Z,Z)-4,11-hexadecadienyl-1-phosphocholine  
455. (Z,Z)-5,12-hexadecadienyl-1-phosphocholine  
456. (Z,Z)-6,13-hexadecadienyl-1-phosphocholine

457. (Z,Z)-3,11-hexadecadienyl-1-phosphocholine  
458. (Z,Z)-4,12-hexadecadienyl-1-phosphocholine  
459. (Z,Z)-5,13-hexadecadienyl-1-phosphocholine

460. (Z,Z)-3,12-hexadecadienyl-1-phosphocholine  
461. (Z,Z)-4,13-hexadecadienyl-1-phosphocholine

462. (Z,Z)-3,13-hexadecadienyl-1-phosphocholine

#### 17 chain carbon atoms

$C_{22}H_{44}NO_4P$  (417.57)

463. (Z,Z)-3,7-heptadecadienyl-1-phosphocholine  
464. (Z,Z)-4,8-heptadecadienyl-1-phosphocholine  
465. (Z,Z)-5,9-heptadecadienyl-1-phosphocholine  
466. (Z,Z)-6,10-heptadecadienyl-1-phosphocholine  
467. (Z,Z)-7,11-heptadecadienyl-1-phosphocholine  
468. (Z,Z)-8,12-heptadecadienyl-1-phosphocholine  
469. (Z,Z)-9,13-heptadecadienyl-1-phosphocholine  
470. (Z,Z)-10,14-heptadecadienyl-1-phosphocholine

471. (Z,Z)-3,8-heptadecadienyl-1-phosphocholine  
472. (Z,Z)-4,9-heptadecadienyl-1-phosphocholine  
473. (Z,Z)-5,10-heptadecadienyl-1-phosphocholine  
474. (Z,Z)-6,11-heptadecadienyl-1-phosphocholine  
475. (Z,Z)-7,12-heptadecadienyl-1-phosphocholine  
476. (Z,Z)-8,13-heptadecadienyl-1-phosphocholine  
477. (Z,Z)-9,14-heptadecadienyl-1-phosphocholine

478. (Z,Z)-3,9-heptadecadienyl-1-phosphocholine  
479. (Z,Z)-4,10-heptadecadienyl-1-phosphocholine

480. (Z,Z)-5,11-heptadecadienyl-1-phosphocholine  
481. (Z,Z)-6,12-heptadecadienyl-1-phosphocholine  
482. (Z,Z)-7,13-heptadecadienyl-1-phosphocholine  
483. (Z,Z)-8,14-heptadecadienyl-1-phosphocholine  
  
484. (Z,Z)-3,10-heptadecadienyl-1-phosphocholine  
485. (Z,Z)-4,11-heptadecadienyl-1-phosphocholine  
486. (Z,Z)-5,12-heptadecadienyl-1-phosphocholine  
487. (Z,Z)-6,13-heptadecadienyl-1-phosphocholine  
488. (Z,Z)-7,14-heptadecadienyl-1-phosphocholine  
  
489. (Z,Z)-3,11-heptadecadienyl-1-phosphocholine  
490. (Z,Z)-4,12-heptadecadienyl-1-phosphocholine  
491. (Z,Z)-5,13-heptadecadienyl-1-phosphocholine  
492. (Z,Z)-6,14-heptadecadienyl-1-phosphocholine  
  
493. (Z,Z)-3,12-heptadecadienyl-1-phosphocholine  
494. (Z,Z)-4,13-heptadecadienyl-1-phosphocholine  
495. (Z,Z)-5,14-heptadecadienyl-1-phosphocholine  
  
496. (Z,Z)-3,13-heptadecadienyl-1-phosphocholine  
497. (Z,Z)-4,14-heptadecadienyl-1-phosphocholine  
  
498. (Z,Z)-3,14-heptadecadienyl-1-phosphocholine

#### 18 chain carbon atoms

$C_{23}H_{46}NO_4P$  (431.60)

499. (Z,Z)-3,7-octadecadienyl-1-phosphocholine  
500. (Z,Z)-4,8-octadecadienyl-1-phosphocholine  
501. (Z,Z)-5,9-octadecadienyl-1-phosphocholine  
502. (Z,Z)-6,10-octadecadienyl-1-phosphocholine  
503. (Z,Z)-7,11-octadecadienyl-1-phosphocholine  
504. (Z,Z)-8,12-octadecadienyl-1-phosphocholine  
505. (Z,Z)-9,13-octadecadienyl-1-phosphocholine  
506. (Z,Z)-10,14-octadecadienyl-1-phosphocholine  
507. (Z,Z)-11,15-octadecadienyl-1-phosphocholine

508. (Z,Z)-3,8-octadecadienyl-1-phosphocholine  
509. (Z,Z)-4,9-octadecadienyl-1-phosphocholine  
510. (Z,Z)-5,10-octadecadienyl-1-phosphocholine  
511. (Z,Z)-6,11-octadecadienyl-1-phosphocholine  
512. (Z,Z)-7,12-octadecadienyl-1-phosphocholine  
513. (Z,Z)-8,13-octadecadienyl-1-phosphocholine  
514. (Z,Z)-9,14-octadecadienyl-1-phosphocholine  
515. (Z,Z)-10,15-octadecadienyl-1-phosphocholine

516. (Z,Z)-3,9-octadecadienyl-1-phosphocholine  
517. (Z,Z)-4,10-octadecadienyl-1-phosphocholine  
518. (Z,Z)-5,11-octadecadienyl-1-phosphocholine  
519. (Z,Z)-6,12-octadecadienyl-1-phosphocholine  
520. (Z,Z)-7,13-octadecadienyl-1-phosphocholine  
521. (Z,Z)-8,14-octadecadienyl-1-phosphocholine  
522. (Z,Z)-9,15-octadecadienyl-1-phosphocholine

523. (Z,Z)-3,10-octadecadienyl-1-phosphocholine  
524. (Z,Z)-4,11-octadecadienyl-1-phosphocholine  
525. (Z,Z)-5,12-octadecadienyl-1-phosphocholine  
526. (Z,Z)-6,13-octadecadienyl-1-phosphocholine  
527. (Z,Z)-7,14-octadecadienyl-1-phosphocholine  
528. (Z,Z)-8,15-octadecadienyl-1-phosphocholine

529. (Z,Z)-3,11-octadecadienyl-1-phosphocholine  
530. (Z,Z)-4,12-octadecadienyl-1-phosphocholine  
531. (Z,Z)-5,13-octadecadienyl-1-phosphocholine  
532. (Z,Z)-6,14-octadecadienyl-1-phosphocholine  
533. (Z,Z)-7,15-octadecadienyl-1-phosphocholine

534. (Z,Z)-3,12-octadecadienyl-1-phosphocholine  
535. (Z,Z)-4,13-octadecadienyl-1-phosphocholine  
536. (Z,Z)-5,14-octadecadienyl-1-phosphocholine  
537. (Z,Z)-6,15-octadecadienyl-1-phosphocholine

538. (Z,Z)-3,13-octadecadienyl-1-phosphocholine  
539. (Z,Z)-4,14-octadecadienyl-1-phosphocholine



540. (Z,Z)-5,15-octadecadienyl-1-phosphocholine

541. (Z,Z)-3,14-octadecadienyl-1-phosphocholine

542. (Z,Z)-4,15-octadecadienyl-1-phosphocholine

543. (Z,Z)-3,15-octadecadienyl-1-phosphocholine

#### 19 chain carbon atoms

C<sub>24</sub>H<sub>48</sub>NO<sub>4</sub>P (445.62)

544. (Z,Z)-3,7-nonadecadienyl-1-phosphocholine

545. (Z,Z)-4,8-nonadecadienyl-1-phosphocholine

546. (Z,Z)-5,9-nonadecadienyl-1-phosphocholine

547. (Z,Z)-6,10-nonadecadienyl-1-phosphocholine

548. (Z,Z)-7,11-nonadecadienyl-1-phosphocholine

549. (Z,Z)-8,12-nonadecadienyl-1-phosphocholine

550. (Z,Z)-9,13-nonadecadienyl-1-phosphocholine

551. (Z,Z)-10,14-nonadecadienyl-1-phosphocholine

552. (Z,Z)-11,15-nonadecadienyl-1-phosphocholine

553. (Z,Z)-12,16-nonadecadienyl-1-phosphocholine

554. (Z,Z)-3,8-nonadecadienyl-1-phosphocholine

555. (Z,Z)-4,9-nonadecadienyl-1-phosphocholine

556. (Z,Z)-5,10-nonadecadienyl-1-phosphocholine

557. (Z,Z)-6,11-nonadecadienyl-1-phosphocholine

558. (Z,Z)-7,12-nonadecadienyl-1-phosphocholine

559. (Z,Z)-8,13-nonadecadienyl-1-phosphocholine

560. (Z,Z)-9,14-nonadecadienyl-1-phosphocholine

561. (Z,Z)-10,15-nonadecadienyl-1-phosphocholine

562. (Z,Z)-11,16-nonadecadienyl-1-phosphocholine

563. (Z,Z)-3,9-nonadecadienyl-1-phosphocholine

564. (Z,Z)-4,10-nonadecadienyl-1-phosphocholine

565. (Z,Z)-5,11-nonadecadienyl-1-phosphocholine

566. (Z,Z)-6,12-nonadecadienyl-1-phosphocholine

567. (Z,Z)-7,13-nonadecadienyl-1-phosphocholine

568. (Z,Z)-8,14-nonadecadienyl-1-phosphocholine

569. (Z,Z)-9,15-nonadecadienyl-1-phosphocholine  
570. (Z,Z)-10,16-nonadecadienyl-1-phosphocholine
571. (Z,Z)-3,10-nonadecadienyl-1-phosphocholine  
572. (Z,Z)-4,11-nonadecadienyl-1-phosphocholine  
573. (Z,Z)-5,12-nonadecadienyl-1-phosphocholine  
574. (Z,Z)-6,13-nonadecadienyl-1-phosphocholine  
575. (Z,Z)-7,14-nonadecadienyl-1-phosphocholine  
576. (Z,Z)-8,15-nonadecadienyl-1-phosphocholine  
577. (Z,Z)-9,16-nonadecadienyl-1-phosphocholine
578. (Z,Z)-3,11-nonadecadienyl-1-phosphocholine  
579. (Z,Z)-4,12-nonadecadienyl-1-phosphocholine  
580. (Z,Z)-5,13-nonadecadienyl-1-phosphocholine  
581. (Z,Z)-6,14-nonadecadienyl-1-phosphocholine  
582. (Z,Z)-7,15-nonadecadienyl-1-phosphocholine  
583. (Z,Z)-8,16-nonadecadienyl-1-phosphocholine
584. (Z,Z)-3,12-nonadecadienyl-1-phosphocholine  
585. (Z,Z)-4,13-nonadecadienyl-1-phosphocholine  
586. (Z,Z)-5,14-nonadecadienyl-1-phosphocholine  
587. (Z,Z)-6,15-nonadecadienyl-1-phosphocholine  
588. (Z,Z)-7,16-nonadecadienyl-1-phosphocholine
589. (Z,Z)-3,13-nonadecadienyl-1-phosphocholine  
590. (Z,Z)-4,14-nonadecadienyl-1-phosphocholine  
591. (Z,Z)-5,15-nonadecadienyl-1-phosphocholine  
592. (Z,Z)-6,16-nonadecadienyl-1-phosphocholine
593. (Z,Z)-3,14-nonadecadienyl-1-phosphocholine  
594. (Z,Z)-4,15-nonadecadienyl-1-phosphocholine  
595. (Z,Z)-5,16-nonadecadienyl-1-phosphocholine
596. (Z,Z)-3,15-nonadecadienyl-1-phosphocholine  
597. (Z,Z)-4,16-nonadecadienyl-1-phosphocholine

20 chain carbon atoms $C_{25}H_{50}NO_4P$  (459.65)

598. (Z,Z)-3,7-eicosadienyl-1-phosphocholine  
599. (Z,Z)-4,8-eicosadienyl-1-phosphocholine  
600. (Z,Z)-5,9-eicosadienyl-1-phosphocholine  
601. (Z,Z)-6,10-eicosadienyl-1-phosphocholine  
602. (Z,Z)-7,11-eicosadienyl-1-phosphocholine  
603. (Z,Z)-8,12-eicosadienyl-1-phosphocholine  
604. (Z,Z)-9,13-eicosadienyl-1-phosphocholine  
605. (Z,Z)-10,14-eicosadienyl-1-phosphocholine  
606. (Z,Z)-11,15-eicosadienyl-1-phosphocholine  
607. (Z,Z)-12,16-eicosadienyl-1-phosphocholine  
608. (Z,Z)-13,17-eicosadienyl-1-phosphocholine
609. (Z,Z)-3,8-eicosadienyl-1-phosphocholine  
610. (Z,Z)-4,9-eicosadienyl-1-phosphocholine  
611. (Z,Z)-5,10-eicosadienyl-1-phosphocholine  
612. (Z,Z)-6,11-eicosadienyl-1-phosphocholine  
613. (Z,Z)-7,12-eicosadienyl-1-phosphocholine  
614. (Z,Z)-8,13-eicosadienyl-1-phosphocholine  
615. (Z,Z)-9,14-eicosadienyl-1-phosphocholine  
616. (Z,Z)-10,15-eicosadienyl-1-phosphocholine  
617. (Z,Z)-11,16-eicosadienyl-1-phosphocholine  
618. (Z,Z)-12,17-eicosadienyl-1-phosphocholine
619. (Z,Z)-3,9-eicosadienyl-1-phosphocholine  
620. (Z,Z)-4,10-eicosadienyl-1-phosphocholine  
621. (Z,Z)-5,11-eicosadienyl-1-phosphocholine  
622. (Z,Z)-6,12-eicosadienyl-1-phosphocholine  
623. (Z,Z)-7,13-eicosadienyl-1-phosphocholine  
624. (Z,Z)-8,14-eicosadienyl-1-phosphocholine  
625. (Z,Z)-9,15-eicosadienyl-1-phosphocholine  
626. (Z,Z)-10,16-eicosadienyl-1-phosphocholine  
627. (Z,Z)-11,17-eicosadienyl-1-phosphocholine
628. (Z,Z)-3,10-eicosadienyl-1-phosphocholine

629. (Z,Z)-4,11-eicosadienyl-1-phosphocholine  
630. (Z,Z)-5,12-eicosadienyl-1-phosphocholine  
631. (Z,Z)-6,13-eicosadienyl-1-phosphocholine  
632. (Z,Z)-7,14-eicosadienyl-1-phosphocholine  
633. (Z,Z)-8,15-eicosadienyl-1-phosphocholine  
634. (Z,Z)-9,16-eicosadienyl-1-phosphocholine  
635. (Z,Z)-10,17-eicosadienyl-1-phosphocholine
636. (Z,Z)-3,11-eicosadienyl-1-phosphocholine  
637. (Z,Z)-4,12-eicosadienyl-1-phosphocholine  
638. (Z,Z)-5,13-eicosadienyl-1-phosphocholine  
639. (Z,Z)-6,14-eicosadienyl-1-phosphocholine  
640. (Z,Z)-7,15-eicosadienyl-1-phosphocholine  
641. (Z,Z)-8,16-eicosadienyl-1-phosphocholine  
642. (Z,Z)-9,17-eicosadienyl-1-phosphocholine
643. (Z,Z)-3,12-eicosadienyl-1-phosphocholine  
644. (Z,Z)-4,13-eicosadienyl-1-phosphocholine  
645. (Z,Z)-5,14-eicosadienyl-1-phosphocholine  
646. (Z,Z)-6,15-eicosadienyl-1-phosphocholine  
647. (Z,Z)-7,16-eicosadienyl-1-phosphocholine  
648. (Z,Z)-8,17-eicosadienyl-1-phosphocholine
649. (Z,Z)-3,13-eicosadienyl-1-phosphocholine  
650. (Z,Z)-4,14-eicosadienyl-1-phosphocholine  
651. (Z,Z)-5,15-eicosadienyl-1-phosphocholine  
652. (Z,Z)-6,16-eicosadienyl-1-phosphocholine  
653. (Z,Z)-7,17-eicosadienyl-1-phosphocholine
654. (Z,Z)-3,14-eicosadienyl-1-phosphocholine  
655. (Z,Z)-4,15-eicosadienyl-1-phosphocholine  
656. (Z,Z)-5,16-eicosadienyl-1-phosphocholine  
657. (Z,Z)-6,17-eicosadienyl-1-phosphocholine
658. (Z,Z)-3,15-eicosadienyl-1-phosphocholine  
659. (Z,Z)-4,16-eicosadienyl-1-phosphocholine  
660. (Z,Z)-5,17-eicosadienyl-1-phosphocholine

661. (Z,Z)-3,17-eicosadienyl-1-phosphocholine

21 chain carbon atoms

C<sub>26</sub>H<sub>52</sub>NO<sub>4</sub>P (473.68)

662. (Z,Z)-3,7-heneicosadienyl-1-phosphocholine

663. (Z,Z)-4,8-heneicosadienyl-1-phosphocholine

664. (Z,Z)-5,9-heneicosadienyl-1-phosphocholine

665. (Z,Z)-6,10-heneicosadienyl-1-phosphocholine

666. (Z,Z)-7,11-heneicosadienyl-1-phosphocholine

667. (Z,Z)-8,12-heneicosadienyl-1-phosphocholine

668. (Z,Z)-9,13-heneicosadienyl-1-phosphocholine

669. (Z,Z)-10,14-heneicosadienyl-1-phosphocholine

670. (Z,Z)-11,15-heneicosadienyl-1-phosphocholine

671. (Z,Z)-12,16-heneicosadienyl-1-phosphocholine

672. (Z,Z)-13,17-heneicosadienyl-1-phosphocholine

673. (Z,Z)-14,18-heneicosadienyl-1-phosphocholine

674. (Z,Z)-3,8-heneicosadienyl-1-phosphocholine

675. (Z,Z)-4,9-heneicosadienyl-1-phosphocholine

676. (Z,Z)-5,10-heneicosadienyl-1-phosphocholine

677. (Z,Z)-6,11-heneicosadienyl-1-phosphocholine

678. (Z,Z)-7,12-heneicosadienyl-1-phosphocholine

679. (Z,Z)-8,13-heneicosadienyl-1-phosphocholine

680. (Z,Z)-9,14-heneicosadienyl-1-phosphocholine

681. (Z,Z)-10,15-heneicosadienyl-1-phosphocholine

682. (Z,Z)-11,16-heneicosadienyl-1-phosphocholine

683. (Z,Z)-12,17-heneicosadienyl-1-phosphocholine

684. (Z,Z)-13,18-heneicosadienyl-1-phosphocholine

685. (Z,Z)-3,9-heneicosadienyl-1-phosphocholine

686. (Z,Z)-4,10-heneicosadienyl-1-phosphocholine

687. (Z,Z)-5,11-heneicosadienyl-1-phosphocholine

688. (Z,Z)-6,12-heneicosadienyl-1-phosphocholine

689. (Z,Z)-7,13-heneicosadienyl-1-phosphocholine

690. (Z,Z)-8,14-heneicosadienyl-1-phosphocholine

691. (Z,Z)-9,15-heneicosadienyl-1-phosphocholine

692. (Z,Z)-10,16-heneicosadienyl-1-phosphocholine  
693. (Z,Z)-11,17-heneicosadienyl-1-phosphocholine  
694. (Z,Z)-12,18-heneicosadienyl-1-phosphocholine

695. (Z,Z)-3,10-heneicosadienyl-1-phosphocholine  
696. (Z,Z)-4,11-heneicosadienyl-1-phosphocholine  
697. (Z,Z)-5,12-heneicosadienyl-1-phosphocholine  
698. (Z,Z)-6,13-heneicosadienyl-1-phosphocholine  
699. (Z,Z)-7,14-heneicosadienyl-1-phosphocholine  
700. (Z,Z)-8,15-heneicosadienyl-1-phosphocholine  
701. (Z,Z)-9,16-heneicosadienyl-1-phosphocholine  
702. (Z,Z)-10,17-heneicosadienyl-1-phosphocholine  
703. (Z,Z)-11,18-heneicosadienyl-1-phosphocholine

704. (Z,Z)-3,11-heneicosadienyl-1-phosphocholine  
705. (Z,Z)-4,12-heneicosadienyl-1-phosphocholine  
706. (Z,Z)-5,13-heneicosadienyl-1-phosphocholine  
707. (Z,Z)-6,14-heneicosadienyl-1-phosphocholine  
708. (Z,Z)-7,15-heneicosadienyl-1-phosphocholine  
709. (Z,Z)-8,16-heneicosadienyl-1-phosphocholine  
710. (Z,Z)-9,17-heneicosadienyl-1-phosphocholine  
711. (Z,Z)-10,18-heneicosadienyl-1-phosphocholine

712. (Z,Z)-3,12-heneicosadienyl-1-phosphocholine  
713. (Z,Z)-4,13-heneicosadienyl-1-phosphocholine  
714. (Z,Z)-5,14-heneicosadienyl-1-phosphocholine  
715. (Z,Z)-6,15-heneicosadienyl-1-phosphocholine  
716. (Z,Z)-7,16-heneicosadienyl-1-phosphocholine  
717. (Z,Z)-8,17-heneicosadienyl-1-phosphocholine  
718. (Z,Z)-9,18-heneicosadienyl-1-phosphocholine

719. (Z,Z)-3,13-heneicosadienyl-1-phosphocholine  
720. (Z,Z)-4,14-heneicosadienyl-1-phosphocholine  
721. (Z,Z)-5,15-heneicosadienyl-1-phosphocholine  
722. (Z,Z)-6,16-heneicosadienyl-1-phosphocholine  
723. (Z,Z)-7,17-heneicosadienyl-1-phosphocholine  
724. (Z,Z)-8,18-heneicosadienyl-1-phosphocholine

725. (Z,Z)-3,14-heneicosadienyl-1-phosphocholine  
726. (Z,Z)-4,15-heneicosadienyl-1-phosphocholine  
727. (Z,Z)-5,16-heneicosadienyl-1-phosphocholine  
728. (Z,Z)-6,17-heneicosadienyl-1-phosphocholine  
729. (Z,Z)-7,18-heneicosadienyl-1-phosphocholine

730. (Z,Z)-3,15-heneicosadienyl-1-phosphocholine  
731. (Z,Z)-4,16-heneicosadienyl-1-phosphocholine  
732. (Z,Z)-5,17-heneicosadienyl-1-phosphocholine  
733. (Z,Z)-6,18-heneicosadienyl-1-phosphocholine

734. (Z,Z)-3,17-heneicosadienyl-1-phosphocholine  
735. (Z,Z)-4,18-heneicosadienyl-1-phosphocholine

## 22 chain carbon atoms

$C_{27}H_{54}NO_4P$  (487.70)

736. (Z,Z)-3,7-docosadienyl-1-phosphocholine  
737. (Z,Z)-4,8-docosadienyl-1-phosphocholine  
738. (Z,Z)-5,9-docosadienyl-1-phosphocholine  
739. (Z,Z)-6,10-docosadienyl-1-phosphocholine  
740. (Z,Z)-7,11-docosadienyl-1-phosphocholine  
741. (Z,Z)-8,12-docosadienyl-1-phosphocholine  
742. (Z,Z)-9,13-docosadienyl-1-phosphocholine  
743. (Z,Z)-10,14-docosadienyl-1-phosphocholine  
744. (Z,Z)-11,15-docosadienyl-1-phosphocholine  
745. (Z,Z)-12,16-docosadienyl-1-phosphocholine  
746. (Z,Z)-13,17-docosadienyl-1-phosphocholine  
747. (Z,Z)-14,18-docosadienyl-1-phosphocholine  
748. (Z,Z)-15,19-docosadienyl-1-phosphocholine

749. (Z,Z)-3,8-docosadienyl-1-phosphocholine  
750. (Z,Z)-4,9-docosadienyl-1-phosphocholine  
751. (Z,Z)-5,10-docosadienyl-1-phosphocholine  
752. (Z,Z)-6,11-docosadienyl-1-phosphocholine  
753. (Z,Z)-7,12-docosadienyl-1-phosphocholine  
754. (Z,Z)-8,13-docosadienyl-1-phosphocholine

755. (Z,Z)-9,14-docosadienyl-1-phosphocholine  
756. (Z,Z)-10,15-docosadienyl-1-phosphocholine  
757. (Z,Z)-11,16-docosadienyl-1-phosphocholine  
758. (Z,Z)-12,17-docosadienyl-1-phosphocholine  
759. (Z,Z)-13,18-docosadienyl-1-phosphocholine  
760. (Z,Z)-14,19-docosadienyl-1-phosphocholine
761. (Z,Z)-3,9-docosadienyl-1-phosphocholine  
762. (Z,Z)-4,10-docosadienyl-1-phosphocholine  
763. (Z,Z)-5,11-docosadienyl-1-phosphocholine  
764. (Z,Z)-6,12-docosadienyl-1-phosphocholine  
765. (Z,Z)-7,13-docosadienyl-1-phosphocholine  
766. (Z,Z)-8,14-docosadienyl-1-phosphocholine  
767. (Z,Z)-9,15-docosadienyl-1-phosphocholine  
768. (Z,Z)-10,16-docosadienyl-1-phosphocholine  
769. (Z,Z)-11,17-docosadienyl-1-phosphocholine  
770. (Z,Z)-12,18-docosadienyl-1-phosphocholine  
771. (Z,Z)-13,19-docosadienyl-1-phosphocholine
772. (Z,Z)-3,10-docosadienyl-1-phosphocholine  
773. (Z,Z)-4,11-docosadienyl-1-phosphocholine  
774. (Z,Z)-5,12-docosadienyl-1-phosphocholine  
775. (Z,Z)-6,13-docosadienyl-1-phosphocholine  
776. (Z,Z)-7,14-docosadienyl-1-phosphocholine  
777. (Z,Z)-8,15-docosadienyl-1-phosphocholine  
778. (Z,Z)-9,16-docosadienyl-1-phosphocholine  
779. (Z,Z)-10,17-docosadienyl-1-phosphocholine  
780. (Z,Z)-11,18-docosadienyl-1-phosphocholine  
781. (Z,Z)-12,19-docosadienyl-1-phosphocholine
782. (Z,Z)-3,11-docosadienyl-1-phosphocholine  
783. (Z,Z)-4,12-docosadienyl-1-phosphocholine  
784. (Z,Z)-5,13-docosadienyl-1-phosphocholine  
785. (Z,Z)-6,14-docosadienyl-1-phosphocholine  
786. (Z,Z)-7,15-docosadienyl-1-phosphocholine  
787. (Z,Z)-8,16-docosadienyl-1-phosphocholine  
788. (Z,Z)-9,17-docosadienyl-1-phosphocholine  
789. (Z,Z)-10,18-docosadienyl-1-phosphocholine



790. (Z,Z)-11,19-docosadienyl-1-phosphocholine

791. (Z,Z)-3,12-docosadienyl-1-phosphocholine

792. (Z,Z)-4,13-docosadienyl-1-phosphocholine

793. (Z,Z)-5,14-docosadienyl-1-phosphocholine

794. (Z,Z)-6,15-docosadienyl-1-phosphocholine

795. (Z,Z)-7,16-docosadienyl-1-phosphocholine

796. (Z,Z)-8,17-docosadienyl-1-phosphocholine

797. (Z,Z)-9,18-docosadienyl-1-phosphocholine

798. (Z,Z)-10,19-docosadienyl-1-phosphocholine

799. (Z,Z)-3,13-docosadienyl-1-phosphocholine

800. (Z,Z)-4,14-docosadienyl-1-phosphocholine

801. (Z,Z)-5,15-docosadienyl-1-phosphocholine

802. (Z,Z)-6,16-docosadienyl-1-phosphocholine

803. (Z,Z)-7,17-docosadienyl-1-phosphocholine

804. (Z,Z)-8,18-docosadienyl-1-phosphocholine

805. (Z,Z)-9,19-docosadienyl-1-phosphocholine

806. (Z,Z)-3,14-docosadienyl-1-phosphocholine

807. (Z,Z)-4,15-docosadienyl-1-phosphocholine

808. (Z,Z)-5,16-docosadienyl-1-phosphocholine

809. (Z,Z)-6,17-docosadienyl-1-phosphocholine

810. (Z,Z)-7,18-docosadienyl-1-phosphocholine

811. (Z,Z)-8,19-docosadienyl-1-phosphocholine

812. (Z,Z)-3,15-docosadienyl-1-phosphocholine

813. (Z,Z)-4,16-docosadienyl-1-phosphocholine

814. (Z,Z)-5,17-docosadienyl-1-phosphocholine

815. (Z,Z)-6,18-docosadienyl-1-phosphocholine

816. (Z,Z)-7,19-docosadienyl-1-phosphocholine

817. (Z,Z)-3,17-docosadienyl-1-phosphocholine

818. (Z,Z)-4,18-docosadienyl-1-phosphocholine

819. (Z,Z)-5,19-docosadienyl-1-phosphocholine

820. (Z,Z)-3,19-docosadienyl-1-phosphocholine

23 chain carbon atoms $C_{28}H_{56}NO_4P$  (501.73)

821. (Z,Z)-3,7-tricosadienyl-1-phosphocholine  
822. (Z,Z)-4,8-tricosadienyl-1-phosphocholine  
823. (Z,Z)-5,9-tricosadienyl-1-phosphocholine  
824. (Z,Z)-6,10-tricosadienyl-1-phosphocholine  
825. (Z,Z)-7,11-tricosadienyl-1-phosphocholine  
826. (Z,Z)-8,12-tricosadienyl-1-phosphocholine  
827. (Z,Z)-9,13-tricosadienyl-1-phosphocholine  
828. (Z,Z)-10,14-tricosadienyl-1-phosphocholine  
829. (Z,Z)-11,15-tricosadienyl-1-phosphocholine  
830. (Z,Z)-12,16-tricosadienyl-1-phosphocholine  
831. (Z,Z)-13,17-tricosadienyl-1-phosphocholine  
832. (Z,Z)-14,18-tricosadienyl-1-phosphocholine  
833. (Z,Z)-15,19-tricosadienyl-1-phosphocholine  
834. (Z,Z)-16,20-tricosadienyl-1-phosphocholine
835. (Z,Z)-3,8-tricosadienyl-1-phosphocholine  
836. (Z,Z)-4,9-tricosadienyl-1-phosphocholine  
837. (Z,Z)-5,10-tricosadienyl-1-phosphocholine  
838. (Z,Z)-6,11-tricosadienyl-1-phosphocholine  
839. (Z,Z)-7,12-tricosadienyl-1-phosphocholine  
840. (Z,Z)-8,13-tricosadienyl-1-phosphocholine  
841. (Z,Z)-9,14-tricosadienyl-1-phosphocholine  
842. (Z,Z)-10,15-tricosadienyl-1-phosphocholine  
843. (Z,Z)-11,16-tricosadienyl-1-phosphocholine  
844. (Z,Z)-12,17-tricosadienyl-1-phosphocholine  
845. (Z,Z)-13,18-tricosadienyl-1-phosphocholine  
846. (Z,Z)-14,19-tricosadienyl-1-phosphocholine  
847. (Z,Z)-15,20-tricosadienyl-1-phosphocholine
848. (Z,Z)-3,9-tricosadienyl-1-phosphocholine  
849. (Z,Z)-4,10-tricosadienyl-1-phosphocholine  
850. (Z,Z)-5,11-tricosadienyl-1-phosphocholine  
851. (Z,Z)-6,12-tricosadienyl-1-phosphocholine  
852. (Z,Z)-7,13-tricosadienyl-1-phosphocholine

853. (Z,Z)-8,14-tricosadienyl-1-phosphocholine  
854. (Z,Z)-9,15-tricosadienyl-1-phosphocholine  
855. (Z,Z)-10,16-tricosadienyl-1-phosphocholine  
856. (Z,Z)-11,17-tricosadienyl-1-phosphocholine  
857. (Z,Z)-12,18-tricosadienyl-1-phosphocholine  
858. (Z,Z)-13,19-tricosadienyl-1-phosphocholine  
859. (Z,Z)-14,20-tricosadienyl-1-phosphocholine

860. (Z,Z)-3,10-tricosadienyl-1-phosphocholine  
861. (Z,Z)-4,11-tricosadienyl-1-phosphocholine  
862. (Z,Z)-5,12-tricosadienyl-1-phosphocholine  
863. (Z,Z)-6,13-tricosadienyl-1-phosphocholine  
864. (Z,Z)-7,14-tricosadienyl-1-phosphocholine  
865. (Z,Z)-8,15-tricosadienyl-1-phosphocholine  
866. (Z,Z)-9,16-tricosadienyl-1-phosphocholine  
867. (Z,Z)-10,17-tricosadienyl-1-phosphocholine  
868. (Z,Z)-11,18-tricosadienyl-1-phosphocholine  
869. (Z,Z)-12,19-tricosadienyl-1-phosphocholine  
870. (Z,Z)-13,20-tricosadienyl-1-phosphocholine

871. (Z,Z)-3,11-tricosadienyl-1-phosphocholine  
872. (Z,Z)-4,12-tricosadienyl-1-phosphocholine  
873. (Z,Z)-5,13-tricosadienyl-1-phosphocholine  
874. (Z,Z)-6,14-tricosadienyl-1-phosphocholine  
875. (Z,Z)-7,15-tricosadienyl-1-phosphocholine  
876. (Z,Z)-8,16-tricosadienyl-1-phosphocholine  
877. (Z,Z)-9,17-tricosadienyl-1-phosphocholine  
878. (Z,Z)-10,18-tricosadienyl-1-phosphocholine  
879. (Z,Z)-11,19-tricosadienyl-1-phosphocholine  
880. (Z,Z)-12,20-tricosadienyl-1-phosphocholine

881. (Z,Z)-3,12-tricosadienyl-1-phosphocholine  
882. (Z,Z)-4,13-tricosadienyl-1-phosphocholine  
883. (Z,Z)-5,14-tricosadienyl-1-phosphocholine  
884. (Z,Z)-6,15-tricosadienyl-1-phosphocholine  
885. (Z,Z)-7,16-tricosadienyl-1-phosphocholine  
886. (Z,Z)-8,17-tricosadienyl-1-phosphocholine  
887. (Z,Z)-9,18-tricosadienyl-1-phosphocholine

888. (Z,Z)-10,19-tricosadienyl-1-phosphocholine

889. (Z,Z)-11,20-tricosadienyl-1-phosphocholine

890. (Z,Z)-3,13-tricosadienyl-1-phosphocholine

891. (Z,Z)-4,14-tricosadienyl-1-phosphocholine

892. (Z,Z)-5,15-tricosadienyl-1-phosphocholine

893. (Z,Z)-6,16-tricosadienyl-1-phosphocholine

894. (Z,Z)-7,17-tricosadienyl-1-phosphocholine

895. (Z,Z)-8,18-tricosadienyl-1-phosphocholine

896. (Z,Z)-9,19-tricosadienyl-1-phosphocholine

897. (Z,Z)-10,20-tricosadienyl-1-phosphocholine

898. (Z,Z)-3,14-tricosadienyl-1-phosphocholine

899. (Z,Z)-4,15-tricosadienyl-1-phosphocholine

900. (Z,Z)-5,16-tricosadienyl-1-phosphocholine

901. (Z,Z)-6,17-tricosadienyl-1-phosphocholine

902. (Z,Z)-7,18-tricosadienyl-1-phosphocholine

903. (Z,Z)-8,19-tricosadienyl-1-phosphocholine

904. (Z,Z)-9,20-tricosadienyl-1-phosphocholine

905. (Z,Z)-3,15-tricosadienyl-1-phosphocholine

906. (Z,Z)-4,16-tricosadienyl-1-phosphocholine

907. (Z,Z)-5,17-tricosadienyl-1-phosphocholine

908. (Z,Z)-6,18-tricosadienyl-1-phosphocholine

909. (Z,Z)-7,19-tricosadienyl-1-phosphocholine

910. (Z,Z)-8,20-tricosadienyl-1-phosphocholine

911. (Z,Z)-3,17-tricosadienyl-1-phosphocholine

912. (Z,Z)-4,18-tricosadienyl-1-phosphocholine

913. (Z,Z)-5,19-tricosadienyl-1-phosphocholine

914. (Z,Z)-6,20-tricosadienyl-1-phosphocholine

915. (Z,Z)-3,19-tricosadienyl-1-phosphocholine

916. (Z,Z)-4,20-tricosadienyl-1-phosphocholine

24 chain carbon atoms $C_{29}H_{58}NO_4P$  (515.76)

917. (Z,Z)-3,7-tetracosadienyl-1-phosphocholine  
918. (Z,Z)-4,8-tetracosadienyl-1-phosphocholine  
919. (Z,Z)-5,9-tetracosadienyl-1-phosphocholine  
920. (Z,Z)-6,10-tetracosadienyl-1-phosphocholine  
921. (Z,Z)-7,11-tetracosadienyl-1-phosphocholine  
922. (Z,Z)-8,12-tetracosadienyl-1-phosphocholine  
923. (Z,Z)-9,13-tetracosadienyl-1-phosphocholine  
924. (Z,Z)-10,14-tetracosadienyl-1-phosphocholine  
925. (Z,Z)-11,15-tetracosadienyl-1-phosphocholine  
926. (Z,Z)-12,16-tetracosadienyl-1-phosphocholine  
927. (Z,Z)-13,17-tetracosadienyl-1-phosphocholine  
928. (Z,Z)-14,18-tetracosadienyl-1-phosphocholine  
929. (Z,Z)-15,19-tetracosadienyl-1-phosphocholine  
930. (Z,Z)-16,20-tetracosadienyl-1-phosphocholine  
931. (Z,Z)-17,21-tetracosadienyl-1-phosphocholine
932. (Z,Z)-3,8-tetracosadienyl-1-phosphocholine  
933. (Z,Z)-4,9-tetracosadienyl-1-phosphocholine  
934. (Z,Z)-5,10-tetracosadienyl-1-phosphocholine  
935. (Z,Z)-6,11-tetracosadienyl-1-phosphocholine  
936. (Z,Z)-7,12-tetracosadienyl-1-phosphocholine  
937. (Z,Z)-8,13-tetracosadienyl-1-phosphocholine  
938. (Z,Z)-9,14-tetracosadienyl-1-phosphocholine  
939. (Z,Z)-10,15-tetracosadienyl-1-phosphocholine  
940. (Z,Z)-11,16-tetracosadienyl-1-phosphocholine  
941. (Z,Z)-12,17-tetracosadienyl-1-phosphocholine  
942. (Z,Z)-13,18-tetracosadienyl-1-phosphocholine  
943. (Z,Z)-14,19-tetracosadienyl-1-phosphocholine  
944. (Z,Z)-15,20-tetracosadienyl-1-phosphocholine  
945. (Z,Z)-16,21-tetracosadienyl-1-phosphocholine
946. (Z,Z)-3,9-tetracosadienyl-1-phosphocholine  
947. (Z,Z)-4,10-tetracosadienyl-1-phosphocholine  
948. (Z,Z)-5,11-tetracosadienyl-1-phosphocholine

949. (Z,Z)-6,12-tetracosadienyl-1-phosphocholine  
950. (Z,Z)-7,13-tetracosadienyl-1-phosphocholine  
951. (Z,Z)-8,14-tetracosadienyl-1-phosphocholine  
952. (Z,Z)-9,15-tetracosadienyl-1-phosphocholine  
953. (Z,Z)-10,16-tetracosadienyl-1-phosphocholine  
954. (Z,Z)-11,17-tetracosadienyl-1-phosphocholine  
955. (Z,Z)-12,18-tetracosadienyl-1-phosphocholine  
956. (Z,Z)-13,19-tetracosadienyl-1-phosphocholine  
957. (Z,Z)-14,20-tetracosadienyl-1-phosphocholine  
958. (Z,Z)-15,21-tetracosadienyl-1-phosphocholine
959. (Z,Z)-3,10-tetracosadienyl-1-phosphocholine  
960. (Z,Z)-4,11-tetracosadienyl-1-phosphocholine  
961. (Z,Z)-5,12-tetracosadienyl-1-phosphocholine  
962. (Z,Z)-6,13-tetracosadienyl-1-phosphocholine  
963. (Z,Z)-7,14-tetracosadienyl-1-phosphocholine  
964. (Z,Z)-8,15-tetracosadienyl-1-phosphocholine  
965. (Z,Z)-9,16-tetracosadienyl-1-phosphocholine  
966. (Z,Z)-10,17-tetracosadienyl-1-phosphocholine  
967. (Z,Z)-11,18-tetracosadienyl-1-phosphocholine  
968. (Z,Z)-12,19-tetracosadienyl-1-phosphocholine  
969. (Z,Z)-13,20-tetracosadienyl-1-phosphocholine  
970. (Z,Z)-14,21-tetracosadienyl-1-phosphocholine
971. (Z,Z)-3,11-tetracosadienyl-1-phosphocholine  
972. (Z,Z)-4,12-tetracosadienyl-1-phosphocholine  
973. (Z,Z)-5,13-tetracosadienyl-1-phosphocholine  
974. (Z,Z)-6,14-tetracosadienyl-1-phosphocholine  
975. (Z,Z)-7,15-tetracosadienyl-1-phosphocholine  
976. (Z,Z)-8,16-tetracosadienyl-1-phosphocholine  
977. (Z,Z)-9,17-tetracosadienyl-1-phosphocholine  
978. (Z,Z)-10,18-tetracosadienyl-1-phosphocholine  
979. (Z,Z)-11,19-tetracosadienyl-1-phosphocholine  
980. (Z,Z)-12,20-tetracosadienyl-1-phosphocholine  
981. (Z,Z)-13,21-tetracosadienyl-1-phosphocholine
982. (Z,Z)-3,12-tetracosadienyl-1-phosphocholine  
983. (Z,Z)-4,13-tetracosadienyl-1-phosphocholine

984. (Z,Z)-5,14-tetracosadienyl-1-phosphocholine  
985. (Z,Z)-6,15-tetracosadienyl-1-phosphocholine  
986. (Z,Z)-7,16-tetracosadienyl-1-phosphocholine  
987. (Z,Z)-8,17-tetracosadienyl-1-phosphocholine  
988. (Z,Z)-9,18-tetracosadienyl-1-phosphocholine  
989. (Z,Z)-10,19-tetracosadienyl-1-phosphocholine  
990. (Z,Z)-11,20-tetracosadienyl-1-phosphocholine  
991. (Z,Z)-12,21-tetracosadienyl-1-phosphocholine
992. (Z,Z)-3,13-tetracosadienyl-1-phosphocholine  
993. (Z,Z)-4,14-tetracosadienyl-1-phosphocholine  
994. (Z,Z)-5,15-tetracosadienyl-1-phosphocholine  
995. (Z,Z)-6,16-tetracosadienyl-1-phosphocholine  
996. (Z,Z)-7,17-tetracosadienyl-1-phosphocholine  
997. (Z,Z)-8,18-tetracosadienyl-1-phosphocholine  
998. (Z,Z)-9,19-tetracosadienyl-1-phosphocholine  
999. (Z,Z)-10,20-tetracosadienyl-1-phosphocholine  
1000. (Z,Z)-11,21-tetracosadienyl-1-phosphocholine
1001. (Z,Z)-3,14-tetracosadienyl-1-phosphocholine  
1002. (Z,Z)-4,15-tetracosadienyl-1-phosphocholine  
1003. (Z,Z)-5,16-tetracosadienyl-1-phosphocholine  
1004. (Z,Z)-6,17-tetracosadienyl-1-phosphocholine  
1005. (Z,Z)-7,18-tetracosadienyl-1-phosphocholine  
1006. (Z,Z)-8,19-tetracosadienyl-1-phosphocholine  
1007. (Z,Z)-9,20-tetracosadienyl-1-phosphocholine  
1008. (Z,Z)-10,21-tetracosadienyl-1-phosphocholine
1009. (Z,Z)-3,15-tetracosadienyl-1-phosphocholine  
1010. (Z,Z)-4,16-tetracosadienyl-1-phosphocholine  
1011. (Z,Z)-5,17-tetracosadienyl-1-phosphocholine  
1012. (Z,Z)-6,18-tetracosadienyl-1-phosphocholine  
1013. (Z,Z)-7,19-tetracosadienyl-1-phosphocholine  
1014. (Z,Z)-8,20-tetracosadienyl-1-phosphocholine  
1015. (Z,Z)-9,21-tetracosadienyl-1-phosphocholine
1016. (Z,Z)-3,17-tetracosadienyl-1-phosphocholine  
1017. (Z,Z)-4,18-tetracosadienyl-1-phosphocholine

1018. (Z,Z)-5,19-tetracosadienyl-1-phosphocholine  
 1019. (Z,Z)-6,20-tetracosadienyl-1-phosphocholine  
 1020. (Z,Z)-7,21-tetracosadienyl-1-phosphocholine  
 1021. (Z,Z)-3,19-tetracosadienyl-1-phosphocholine  
 1022. (Z,Z)-4,20-tetracosadienyl-1-phosphocholine  
 1023. (Z,Z)-5,21-tetracosadienyl-1-phosphocholine

### 25 chain carbon atoms

C<sub>30</sub>H<sub>60</sub>NO<sub>4</sub>P (529.78)

1024. (Z,Z)-6,12-pentacosadienyl-1-phosphocholine  
 1025. (Z,Z)-9,15-pentacosadienyl-1-phosphocholine  
 1026. (Z,Z)-6,16-pentacosadienyl-1-phosphocholine  
 1027. (Z,Z)-9,18-pentacosadienyl-1-phosphocholine  
 1028. (Z,Z)-10,20-pentacosadienyl-1-phosphocholine  
 1029. (Z,Z)-13,20-pentacosadienyl-1-phosphocholine

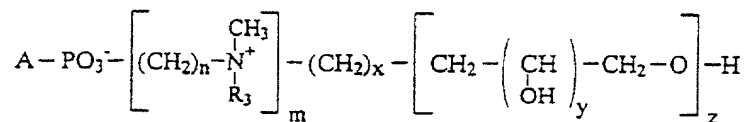
### 26 chain carbon atoms

C<sub>31</sub>H<sub>62</sub>NO<sub>4</sub>P (543.81)

1030. (Z,Z)-6,12-hexacosadienyl-1-phosphocholine  
 1031. (Z,Z)-9,15-hexacosadienyl-1-phosphocholine  
 1032. (Z,Z)-6,16-hexacosadienyl-1-phosphocholine  
 1033. (Z,Z)-9,18-hexacosadienyl-1-phosphocholine  
 1034. (Z,Z)-6,20-hexacosadienyl-1-phosphocholine

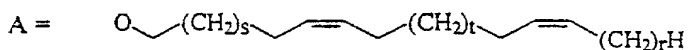
### 5. Examples of (Z,Z)-alkadienyl-1-phospho-N,N,N-trimethylpropylammonium compounds

(A = IX; n = 3; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)



where A is a diunsaturated alkyl chain of the following structure (s,t,r ≥ 0; 8 ≤ s+t+r ≤ 26):



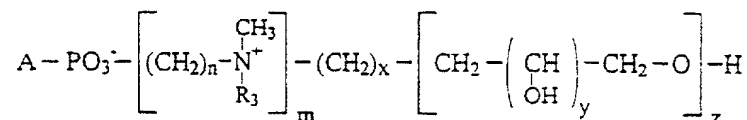


formula IX

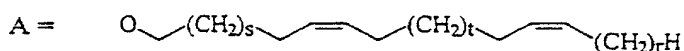
- 1035.) (Z,Z)-5,11-hexadecadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
 $\text{C}_{22}\text{H}_{44}\text{NO}_4\text{P}$  (417.57)
- 1036.) (Z,Z)-5,11-heptadecadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
 $\text{C}_{23}\text{H}_{46}\text{NO}_4\text{P}$  (431.60)
- 1037.) (Z,Z)-5,11-octadecadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
 $\text{C}_{24}\text{H}_{48}\text{NO}_4\text{P}$  (445.62)
- 1038.) (Z,Z)-6,12-nonadecadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
 $\text{C}_{25}\text{H}_{50}\text{NO}_4\text{P}$  (459.65)
- 1039.) (Z,Z)-10,16-eicosadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
 $\text{C}_{26}\text{H}_{52}\text{NO}_4\text{P}$  (473.68)
- 1040.) (Z,Z)-10,16-heneicosadienyl-1-phospho-N,N,N-trimethylpropylammonium  
 $\text{C}_{27}\text{H}_{54}\text{NO}_4\text{P}$  (487.70)
- 1041.) (Z,Z)-10,16-docosadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
 $\text{C}_{28}\text{H}_{56}\text{NO}_4\text{P}$  (501.73)
- 1042.) (Z,Z)-10,16-tricosadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
 $\text{C}_{29}\text{H}_{58}\text{NO}_4\text{P}$  (515.76)
- 1043.) (Z,Z)-6,18-tetracosadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
 $\text{C}_{30}\text{H}_{60}\text{NO}_4\text{P}$  (529.78)

**6. Examples of (Z,Z)-alkadienyl-1-phospho-N,N,N-trimethylbutylammonium compounds**

(A = IX; n = 4; R<sub>3</sub>; CH<sub>3</sub>; m = 1, x = 1; z = 0)



where A is a diunsaturated alkyl chain of the following structure (s,t,r ≥ 0; 8 ≤ s+t+r ≤ 26):



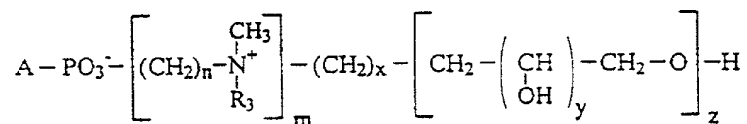
**formula IX**

- 1044.) (Z,Z)-5,11-hexadecadienyl-1-phospho-N,N,N-trimethylbutylammonium  
C<sub>23</sub>H<sub>46</sub>NO<sub>4</sub>P (431.60)
- 1045.) (Z,Z)-5,11-heptadecadienyl-1-phospho-N,N,N-trimethylbutylammonium  
C<sub>24</sub>H<sub>48</sub>NO<sub>4</sub>P (445.62)
- 1046.) (Z,Z)-5,11-octadecadienyl-1-phospho-N,N,N-trimethylbutylammonium  
C<sub>25</sub>H<sub>50</sub>NO<sub>4</sub>P (459.65)
- 1047.) (Z,Z)-6,12-nonadecadienyl-1-phospho-N,N,N-trimethylbutylammonium  
C<sub>26</sub>H<sub>52</sub>NO<sub>4</sub>P (473.68)
- 1048.) (Z,Z)-10,16-eicosadienyl-1-phospho-N,N,N-trimethylbutylammonium  
C<sub>27</sub>H<sub>54</sub>NO<sub>4</sub>P (487.70)
- 1049.) (Z,Z)-10,16-heneicosadienyl-1-phospho-N,N,N-trimethylbutylammonium  
C<sub>28</sub>H<sub>56</sub>NO<sub>4</sub>P (501.73)
- 1050.) (Z,Z)-10,16-docosadienyl-1-phospho-N,N,N-trimethylbutylammonium  
C<sub>29</sub>H<sub>58</sub>NO<sub>4</sub>P (515.76)
- 1051.) (Z,Z)-10,16-tricosadienyl-1-phospho-N,N,N-trimethylbutylammonium  
C<sub>30</sub>H<sub>60</sub>NO<sub>4</sub>P (529.78)

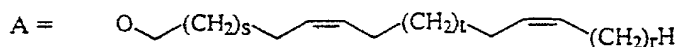
- 1052.) (Z,Z)-6,18-tetracosadienyl-1-phospho-N,N,N-tri-methylbutylammonium  
 $C_{31}H_{62}NO_4P$  (543.81)

7. Examples of terminally unsaturated alkadienyl-phosphocholines

(A = IX; n = 2;  $R_3$ ,  $CH_3$ ; m = 1, x = 1; z = 0)



where A is a diunsaturated alkyl chain of the following structure ( $s, t \geq 0$ ;  $r = 0$ ;  $8 \leq s+t+r \leq 26$ ):

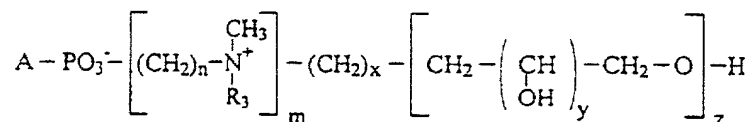


formula IX

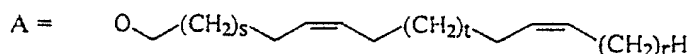
- 1053.) (Z)-11,15-hexadecadienyl-1-phosphocholine  
 $C_{21}H_{42}NO_4P$  (403.54)
- 1054.) (Z)-11,16-heptadecadienyl-1-phosphocholine  
 $C_{22}H_{44}NO_4P$  (417.57)
- 1055.) (Z)-11,17-octadecadienyl-1-phosphocholine  
 $C_{23}H_{46}NO_4P$  (431.60)
- 1056.) (Z)-11,18-nonadecadienyl-1-phosphocholine  
 $C_{24}H_{48}NO_4P$  (445.62)
- 1057.) (Z)-11,19-eicosadienyl-1-phosphocholine  
 $C_{25}H_{50}NO_4P$  (459.65)
- 1058.) (Z)-11,20-heneicosadienyl-1-phosphocholine  
 $C_{26}H_{52}NO_4P$  (473.68)
- 1059.) (Z)-11,21-docosadienyl-1-phosphocholine  
 $C_{27}H_{54}NO_4P$  (487.70)
- 1060.) (Z)-11,22-tricosadienyl-1-phosphocholine  
 $C_{28}H_{56}NO_4P$  (501.73)
- 1061.) (Z)-11,23-tetracosadienyl-1-phosphocholine  
 $C_{29}H_{58}NO_4P$  (515.76)
- 1062.) (Z)-11,24-pentacosadienyl-1-phosphocholine  
 $C_{30}H_{60}NO_4P$  (529.78)

**8. Examples of terminally unsaturated alkadienyl-1-phospho-N,N,N-trimethylpropylammonium compounds**

(A = IX; n = 3; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)



where A is a diunsaturated alkyl chain of the following structure (s, t ≥ 0; r = 0; 8 ≤ s+t+r ≤ 26):



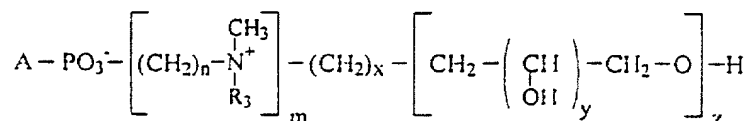
**formula IX**

- 1063.) (Z)-11,15-hexadecadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
C<sub>22</sub>H<sub>44</sub>NO<sub>4</sub>P (417.57)
- 1064.) (Z)-11,16-heptadecadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
C<sub>23</sub>H<sub>46</sub>NO<sub>4</sub>P (431.60)
- 1065.) (Z)-11,17-octadecadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
C<sub>24</sub>H<sub>48</sub>NO<sub>4</sub>P (445.62)
- 1066.) (Z)-11,18-nonadecadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
C<sub>25</sub>H<sub>50</sub>NO<sub>4</sub>P (459.65)
- 1067.) (Z)-11,19-eicosadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
C<sub>26</sub>H<sub>52</sub>NO<sub>4</sub>P (473.68)
- 1068.) (Z)-11,20-heneicosadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
C<sub>27</sub>H<sub>54</sub>NO<sub>4</sub>P (487.70)
- 1069.) (Z)-11,21-docosadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
C<sub>28</sub>H<sub>56</sub>NO<sub>4</sub>P (501.73)
- 1070.) (Z)-11,22-tricosadienyl-1-phospho-N,N,N-tri-methylpropylammonium  
C<sub>29</sub>H<sub>58</sub>NO<sub>4</sub>P (515.76)

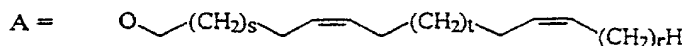
- 1071.) (Z)-11,23-tetracosadienyl-1-phospho-N,N,N-trimethylpropylammonium  
 $C_{30}H_{60}NO_4P$  (529.78)
- 1072.) (Z)-11,24-pentacosadienyl-1-phospho-N,N,N-trimethylpropylammonium  
 $C_{31}H_{62}NO_4P$  (543.81)

**9. Examples of terminally unsaturated alkadienyl-1-phospho-N,N,N-trimethylbutylammonium compounds**

(A = IX; n = 4;  $R_3$ ,  $CH_3$ ; m = 1, x = 1; z = 0)



where A is a diunsaturated alkyl chain of the following structure (s, t ≥ 0; r = 0; 8 ≤ s+t+r ≤ 26):



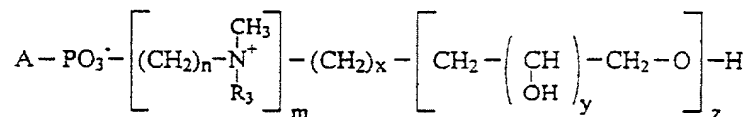
formula IX

- 1073.) (Z)-11,15-hexadecadienyl-1-phospho-N,N,N-trimethylbutylammonium  
 $C_{23}H_{46}NO_4P$  (431.60)
- 1074.) (Z)-11,16-heptadecadienyl-1-phospho-N,N,N-trimethylbutylammonium  
 $C_{24}H_{48}NO_4P$  (445.62)
- 1075.) (Z)-11,17-octadecadienyl-1-phospho-N,N,N-trimethylbutylammonium  
 $C_{25}H_{50}NO_4P$  (459.65)
- 1076.) (Z)-11,18-nonadecadienyl-1-phospho-N,N,N-trimethylbutylammonium  
 $C_{26}H_{52}NO_4P$  (473.68)
- 1077.) (Z)-11,19-eicosadienyl-1-phospho-N,N,N-trimethylbutylammonium  
 $C_{27}H_{54}NO_4P$  (487.70)
- 1078.) (Z)-11,20-heneicosadienyl-1-phospho-N,N,N-trimethylbutylammonium  
 $C_{28}H_{56}NO_4P$  (501.73)

- 1079.) (Z)-11,21-docosadienyl-1-phospho-N,N,N-tri-methylbutylammonium  
 $C_{29}H_{58}NO_4P$  (515.76)
- 1080.) (Z)-11,22-tricosadienyl-1-phospho-N,N,N-tri-methylbutylammonium  
 $C_{30}H_{60}NO_4P$  (529.78)
- 1081.) (Z)-11,23-tetracosadienyl-1-phospho-N,N,N-tri-methylbutylammonium  
 $C_{31}H_{62}NO_4P$  (543.81)
- 1082.) (Z)-11,24-pentacosadienyl-1-phospho-N,N,N-tri-methylbutylammonium  
 $C_{32}H_{64}NO_4P$  (557.84)

**10. Active ingredients based on alkylated (ether)lyso-  
 lecithins - monounsaturated compounds**

(A = III or A = IV; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)



- 1083.) 1-O-(Z)-6-octadecenyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{27}H_{56}NO_6P$  (521.72)
- 1084.) 1-O-(Z)-10-octadecenyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{27}H_{56}NO_6P$  (521.72)
- 1085.) 1-O-(Z)-12-octadecenyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{27}H_{56}NO_6P$  (521.72)
- 1086.) 1-O-(Z)-6-nonadecenyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{28}H_{58}NO_6P$  (535.75)
- 1087.) 1-O-(Z)-10-nonadecenyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{28}H_{58}NO_6P$  (535.75)
- 1088.) 1-O-(Z)-12-nonadecenyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)

- C<sub>28</sub>H<sub>58</sub>NO<sub>6</sub>P (535.75)
- 1089.) 1-O-(Z)-6-eicosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>29</sub>H<sub>60</sub>NO<sub>6</sub>P (549.77)
- 1090.) 1-O-(Z)-10-eicosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>29</sub>H<sub>60</sub>NO<sub>6</sub>P (549.77)
- 1091.) 1-O-(Z)-12-eicosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>29</sub>H<sub>60</sub>NO<sub>6</sub>P (549.77)
- 1092.) 1-O-(Z)-6-heneicosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>30</sub>H<sub>62</sub>NO<sub>6</sub>P (563.80)
- 1093.) 1-O-(Z)-10-heneicosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>30</sub>H<sub>62</sub>NO<sub>6</sub>P (563.80)
- 1094.) 1-O-(Z)-12-heneicosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>30</sub>H<sub>62</sub>NO<sub>6</sub>P (563.80)
- 1095.) 1-O-(Z)-6-docosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>31</sub>H<sub>64</sub>NO<sub>6</sub>P (577.83)
- 1096.) 1-O-(Z)-10-docosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>31</sub>H<sub>64</sub>NO<sub>6</sub>P (577.83)
- 1097.) 1-O-(Z)-12-docosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>31</sub>H<sub>64</sub>NO<sub>6</sub>P (577.83)
- 1098.) 1-O-(Z)-6-tricosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>32</sub>H<sub>66</sub>NO<sub>6</sub>P (591.86)
- 1099.) 1-O-(Z)-10-tricosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>32</sub>H<sub>66</sub>NO<sub>6</sub>P (591.86)
- 1100.) 1-O-(Z)-12-tricosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
C<sub>32</sub>H<sub>66</sub>NO<sub>6</sub>P (591.86)

- 1101.) 1-O-(Z)-6-tetracosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
 $C_{33}H_{68}NO_6P$  (605.89)
- 1102.) 1-O-(Z)-10-tetracosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
 $C_{33}H_{68}NO_6P$  (605.89)
- 1103.) 1-O-(Z)-12-tetracosenyl-2-O-methyl-*sn*-glycero-3-phosphocholine (n = 2)  
 $C_{33}H_{68}NO_6P$  (605.89)
- 1104.) 1-O-(Z)-6-octadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{28}H_{58}NO_6P$  (535.75)
- 1105.) 1-O-(Z)-10-octadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{28}H_{58}NO_6P$  (535.75)
- 1106.) 1-O-(Z)-12-octadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{28}H_{58}NO_6P$  (535.75)
- 1107.) 1-O-(Z)-6-nonadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{29}H_{60}NO_6P$  (549.77)
- 1108.) 1-O-(Z)-10-nonadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{29}H_{60}NO_6P$  (549.77)
- 1109.) 1-O-(Z)-12-nonadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{29}H_{60}NO_6P$  (549.77)
- 1110.) 1-O-(Z)-6-eicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{30}H_{62}NO_6P$  (563.80)
- 1111.) 1-O-(Z)-10-eicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{30}H_{62}NO_6P$  (563.80)
- 1112.) 1-O-(Z)-12-eicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{30}H_{62}NO_6P$  (563.80)



- 1113.) 1-O-(Z)-6-heneicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{31}H_{64}NO_6P$  (577.83)
- 1114.) 1-O-(Z)-10-heneicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{31}H_{64}NO_6P$  (577.83)
- 1115.) 1-O-(Z)-12-heneicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{31}H_{64}NO_6P$  (577.83)
- 1116.) 1-O-(Z)-6-docosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{32}H_{66}NO_6P$  (591.86)
- 1117.) 1-O-(Z)-10-docosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{32}H_{66}NO_6P$  (591.86)
- 1118.) 1-O-(Z)-12-docosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{32}H_{66}NO_6P$  (591.86)
- 1119.) 1-O-(Z)-6-tricosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{33}H_{68}NO_6P$  (605.89)
- 1120.) 1-O-(Z)-10-tricosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{33}H_{68}NO_6P$  (605.89)
- 1121.) 1-O-(Z)-12-tricosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{33}H_{68}NO_6P$  (605.89)
- 1122.) 1-O-(Z)-6-tetracosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{34}H_{70}NO_6P$  (619.91)
- 1123.) 1-O-(Z)-10-tetracosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{34}H_{70}NO_6P$  (619.91)
- 1124.) 1-O-(Z)-12-tetracosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{34}H_{70}NO_6P$  (619.91)

- 1125.) 1-O-(Z)-6-octadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{29}H_{60}NO_6P$  (549.77)
- 1126.) 1-O-(Z)-10-octadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{29}H_{60}NO_6P$  (549.77)
- 1127.) 1-O-(Z)-12-octadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{29}H_{60}NO_6P$  (549.77)
- 1128.) 1-O-(Z)-6-nonadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{30}H_{62}NO_6P$  (563.80)
- 1129.) 1-O-(Z)-10-nonadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{30}H_{62}NO_6P$  (563.80)
- 1130.) 1-O-(Z)-12-nonadecenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{30}H_{62}NO_6P$  (563.80)
- 1131.) 1-O-(Z)-6-eicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{31}H_{64}NO_6P$  (577.83)
- 1132.) 1-O-(Z)-10-eicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{31}H_{64}NO_6P$  (577.83)
- 1133.) 1-O-(Z)-12-eicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{31}H_{64}NO_6P$  (577.83)
- 1134.) 1-O-(Z)-6-heneicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{32}H_{66}NO_6P$  (591.86)
- 1135.) 1-O-(Z)-10-heneicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{32}H_{66}NO_6P$  (591.86)
- 1136.) 1-O-(Z)-12-heneicosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
 $C_{32}H_{66}NO_6P$  (591.86)
- 1137.) 1-O-(Z)-6-docosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)

- C<sub>33</sub>H<sub>68</sub>NO<sub>6</sub>P (605.89)
- 1138.) 1-O-(Z)-10-docosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>33</sub>H<sub>68</sub>NO<sub>6</sub>P (605.89)
- 1139.) 1-O-(Z)-12-docosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>33</sub>H<sub>68</sub>NO<sub>6</sub>P (605.89)
- 1140.) 1-O-(Z)-6-tricosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>34</sub>H<sub>70</sub>NO<sub>6</sub>P (619.91)
- 1141.) 1-O-(Z)-10-tricosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>34</sub>H<sub>70</sub>NO<sub>6</sub>P (619.91)
- 1142.) 1-O-(Z)-12-tricosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>34</sub>H<sub>70</sub>NO<sub>6</sub>P (619.91)
- 1143.) 1-O-(Z)-6-tetracosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>35</sub>H<sub>72</sub>NO<sub>6</sub>P (633.93)
- 1144.) 1-O-(Z)-10-tetracosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>35</sub>H<sub>72</sub>NO<sub>6</sub>P (633.93)
- 1145.) 1-O-(Z)-12-tetracosenyl-2-O-methyl-*sn*-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>35</sub>H<sub>72</sub>NO<sub>6</sub>P (633.93)
- 1146.) 1-O-(Z)-10-octadecenyl-3-O-methyl-*sn*-glycero-2-phosphocholine (n = 2)  
C<sub>27</sub>H<sub>56</sub>NO<sub>6</sub>P (521.72)
- 1147.) 1-O-(Z)-6-nonadecenyl-3-O-methyl-*sn*-glycero-2-phosphocholine (n = 2)  
C<sub>28</sub>H<sub>58</sub>NO<sub>6</sub>P (535.75)
- 1148.) 1-O-(Z)-12-eicosenyl-3-O-methyl-*sn*-glycero-2-phosphocholine (n = 2)  
C<sub>29</sub>H<sub>60</sub>NO<sub>6</sub>P (549.77)
- 1149.) 1-O-(Z)-10-heneicosenyl-3-O-methyl-*sn*-glycero-2-phosphocholine (n = 2)  
C<sub>30</sub>H<sub>62</sub>NO<sub>6</sub>P (563.80)

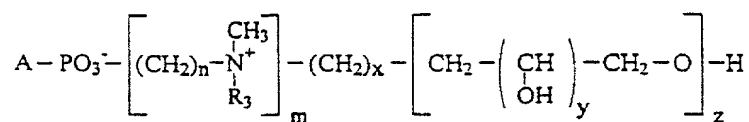
- 1150.) 1-O-(Z)-10-docosenyl-3-O-methyl-*sn*-glycero-2-phosphocholine (n = 2)  
 $C_{31}H_{64}NO_6P$  (577.83)
- 1151.) 1-O-(Z)-12-docosenyl-3-O-methyl-*sn*-glycero-2-phosphocholine (n = 2)  
 $C_{31}H_{64}NO_6P$  (577.83)
- 1152.) 1-O-(Z)-10-tricosenyl-3-O-methyl-*sn*-glycero-2-phosphocholine (n = 2)  
 $C_{32}H_{66}NO_6P$  (591.86)
- 1153.) 1-O-(Z)-10-tetracosenyl-3-O-methyl-*sn*-glycero-2-phosphocholine (n = 2)  
 $C_{33}H_{68}NO_6P$  (605.89)
- 1154.) 1-O-(Z)-10-octadecenyl-3-O-methyl-*sn*-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{28}H_{58}NO_6P$  (535.75)
- 1155.) 1-O-(Z)-6-nonadecenyl-3-O-methyl-*sn*-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{29}H_{60}NO_6P$  (549.77)
- 1156.) 1-O-(Z)-12-eicosenyl-3-O-methyl-*sn*-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{30}H_{62}NO_6P$  (563.80)
- 1157.) 1-O-(Z)-10-heneicosenyl-3-O-methyl-*sn*-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{31}H_{64}NO_6P$  (577.83)
- 1158.) 1-O-(Z)-10-docosenyl-3-O-methyl-*sn*-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{32}H_{66}NO_6P$  (591.86)
- 1159.) 1-O-(Z)-12-docosenyl-3-O-methyl-*sn*-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{32}H_{66}NO_6P$  (591.86)
- 1160.) 1-O-(Z)-10-tricosenyl-3-O-methyl-*sn*-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{33}H_{68}NO_6P$  (605.89)
- 1161.) 1-O-(Z)-10-tetracosenyl-3-O-methyl-*sn*-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{34}H_{70}NO_6P$  (619.91)

- 1162.) 1-O-(Z)-10-octadecenyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{30}H_{62}NO_6P$  (563.80)
- 1163.) 1-O-(Z)-6-nonadecenyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{31}H_{64}NO_6P$  (577.82)
- 1164.) 1-O-(Z)-12-eicosenyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{32}H_{66}NO_6P$  (591.85)
- 1165.) 1-O-(Z)-10-heneicosenyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{33}H_{68}NO_6P$  (605.88)
- 1166.) 1-O-(Z)-10-docosenyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{34}H_{70}NO_6P$  (619.91)
- 1167.) 1-O-(Z)-12-docosenyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{34}H_{70}NO_6P$  (619.91)
- 1168.) 1-O-(Z)-10-tricosenyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{35}H_{72}NO_6P$  (633.94)
- 1169.) 1-O-(Z)-10-tetracosenyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{36}H_{74}NO_6P$  (647.97)
- 1170.) 1-O-(Z)-10-octadecenyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{31}H_{64}NO_6P$  (577.82)
- 1171.) 1-O-(Z)-6-nonadecenyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{32}H_{66}NO_6P$  (591.85)
- 1172.) 1-O-(Z)-12-eicosenyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{33}H_{68}NO_6P$  (605.88)

- 1173.) 1-O-(Z)-10-heneicosenyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>34</sub>H<sub>70</sub>NO<sub>6</sub>P (619.91)
- 1174.) 1-O-(Z)-10-docosenyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>35</sub>H<sub>72</sub>NO<sub>6</sub>P (633.94)
- 1175.) 1-O-(Z)-12-docosenyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>35</sub>H<sub>72</sub>NO<sub>6</sub>P (633.94)
- 1176.) 1-O-(Z)-10-tricosenyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>36</sub>H<sub>74</sub>NO<sub>6</sub>P (647.97)
- 1177.) 1-O-(Z)-10-tetracosenyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>37</sub>H<sub>76</sub>NO<sub>6</sub>P (661.99)

**11. Active ingredients based on alkylated (ether) lysolecithins - diunsaturated compounds**

(A = III or A = IV; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)



**1-O-(Z,Z)-Alkadienyl-2-O-methyl-sn-glycero-3-phosphocholines**

- 1178.) 1-O-(Z,Z)-6,12-hexadecadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>25</sub>H<sub>50</sub>NO<sub>6</sub>P (491.65)
- 1179.) 1-O-(Z,Z)-6,12-heptadecadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>26</sub>H<sub>52</sub>NO<sub>6</sub>P (505.68)

- 1180.) 1-O-(Z,Z)-6,12-octadecadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>27</sub>H<sub>54</sub>NO<sub>6</sub>P (519.71)
- 1181.) 1-O-(Z,Z)-6,12-nonadecadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>28</sub>H<sub>56</sub>NO<sub>6</sub>P (533.74)
- 1182.) 1-O-(Z,Z)-9,15-eicosadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>29</sub>H<sub>58</sub>NO<sub>6</sub>P (547.77)
- 1183.) 1-O-(Z,Z)-9,15-heneicosadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>30</sub>H<sub>60</sub>NO<sub>6</sub>P (561.8)
- 1184.) 1-O-(Z,Z)-5,17-docosadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>31</sub>H<sub>62</sub>NO<sub>6</sub>P (575.83)
- 1185.) 1-O-(Z,Z)-6,18-tricosadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>32</sub>H<sub>64</sub>NO<sub>6</sub>P (589.86)
- 1186.) 1-O-(Z,Z)-6,18-tetracosadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>33</sub>H<sub>66</sub>NO<sub>6</sub>P (603.89)
- 1187.) 1-O-(Z,Z)-6,18-pentacosadienyl-2-O-methyl-sn-glycero-3-phosphocholine (n = 2)  
C<sub>34</sub>H<sub>68</sub>NO<sub>6</sub>P (617.92)

1-O-(Z,Z)-Alkadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium compounds

- 1188.) 1-O-(Z,Z)-6,12-hexadecadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>26</sub>H<sub>52</sub>NO<sub>6</sub>P (505.68)
- 1189.) 1-O-(Z,Z)-6,12-heptadecadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>27</sub>H<sub>54</sub>NO<sub>6</sub>P (519.71)

- 1190.) 1-O-(Z,Z)-6,12-octadecadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{28}H_{56}NO_6P$  (533.74)
- 1191.) 1-O-(Z,Z)-6,12-nonadecadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{29}H_{58}NO_6P$  (547.77)
- 1192.) 1-O-(Z,Z)-9,15-eicosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{30}H_{60}NO_6P$  (561.8)
- 1193.) 1-O-(Z,Z)-9,15-heneicosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{31}H_{62}NO_6P$  (575.83)
- 1194.) 1-O-(Z,Z)-5,17-docosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{32}H_{64}NO_6P$  (589.86)
- 1195.) 1-O-(Z,Z)-6,18-tricosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{33}H_{66}NO_6P$  (603.89)
- 1196.) 1-O-(Z,Z)-6,18-tetracosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{34}H_{68}NO_6P$  (617.92)
- 1197.) 1-O-(Z,Z)-6,18-pentacosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{35}H_{70}NO_6P$  (631.95)



1-O-(Z,Z)-Alkadienyl-2-O-methyl-sn-glycero-3-phospho-  
N,N,N-trimethylbutylammonium compounds

- 1198.) 1-O-(Z,Z)-6,12-hexadecadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium  
(n = 4)  
 $C_{27}H_{54}NO_6P$  (519.71)
- 1199.) 1-O-(Z,Z)-6,12-heptadecadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium  
(n = 4)  
 $C_{28}H_{56}NO_6P$  (533.74)
- 1200.) 1-O-(Z,Z)-6,12-octadecadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium  
(n = 4)  
 $C_{29}H_{58}NO_6P$  (547.77)
- 1201.) 1-O-(Z,Z)-6,12-nonadecadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium  
(n = 4)  
 $C_{30}H_{60}NO_6P$  (561.8)
- 1202.) 1-O-(Z,Z)-9,15-eicosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium  
(n = 4)  
 $C_{31}H_{62}NO_6P$  (575.83)
- 1203.) 1-O-(Z,Z)-9,15-heneicosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium  
(n = 4)  
 $C_{32}H_{64}NO_6P$  (589.86)
- 1204.) 1-O-(Z,Z)-5,17-docosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium  
(n = 4)  
 $C_{33}H_{66}NO_6P$  (603.89)
- 1205.) 1-O-(Z,Z)-6,18-tricosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium  
(n = 4)  
 $C_{34}H_{68}NO_6P$  (617.92)
- 1206.) 1-O-(Z,Z)-6,18-tetracosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium  
(n = 4)

- C<sub>35</sub>H<sub>70</sub>NO<sub>6</sub>P (631.95)  
1207.) 1-O-(Z,Z)-6,18-pentacosadienyl-2-O-methyl-sn-glycero-3-phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>36</sub>H<sub>72</sub>NO<sub>6</sub>P (645.94)

1-O-(Z,Z)-Alkadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)

- 1208.) 1-O-(Z,Z)-6,12-hexadecadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)  
C<sub>25</sub>H<sub>50</sub>NO<sub>6</sub>P (491.65)  
1209.) 1-O-(Z,Z)-6,12-heptadecadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)  
C<sub>26</sub>H<sub>52</sub>NO<sub>6</sub>P (505.68)  
1210.) 1-O-(Z,Z)-6,12-octadecadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)  
C<sub>27</sub>H<sub>54</sub>NO<sub>6</sub>P (519.71)  
1211.) 1-O-(Z,Z)-6,12-nonadecadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)  
C<sub>28</sub>H<sub>56</sub>NO<sub>6</sub>P (533.74)  
1212.) 1-O-(Z,Z)-9,15-eicosadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)  
C<sub>29</sub>H<sub>58</sub>NO<sub>6</sub>P (547.77)  
1213.) 1-O-(Z,Z)-9,15-heneicosadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)  
C<sub>30</sub>H<sub>60</sub>NO<sub>6</sub>P (561.8)  
1214.) 1-O-(Z,Z)-5,17-docosadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)  
C<sub>31</sub>H<sub>62</sub>NO<sub>6</sub>P (575.83)  
1215.) 1-O-(Z,Z)-6,18-tricosadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)  
C<sub>32</sub>H<sub>64</sub>NO<sub>6</sub>P (589.86)  
1216.) 1-O-(Z,Z)-6,18-tetracosadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)  
C<sub>29</sub>H<sub>58</sub>NO<sub>4</sub>P (515.76)  
1217.) 1-O-(Z,Z)-6,18-pentacosadienyl-3-O-methyl-sn-glycero-2-phosphocholine (n = 2)



1-O-(Z,Z)-Alkadienyl-3-O-methyl-sn-glycero-2-phospho-  
N,N,N-trimethylpropylammonium compounds

- 1218.) 1-O-(Z,Z)-6,12-hexadecadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $\text{C}_{26}\text{H}_{52}\text{NO}_6\text{P} \quad (505.68)$
- 1219.) 1-O-(Z,Z)-6,12-heptadecadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $\text{C}_{27}\text{H}_{54}\text{NO}_6\text{P} \quad (519.71)$
- 1220.) 1-O-(Z,Z)-6,12-octadecadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $\text{C}_{28}\text{H}_{56}\text{NO}_6\text{P} \quad (533.74)$
- 1221.) 1-O-(Z,Z)-6,12-nonadecadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $\text{C}_{29}\text{H}_{58}\text{NO}_6\text{P} \quad (547.77)$
- 1222.) 1-O-(Z,Z)-9,15-eicosadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $\text{C}_{30}\text{H}_{60}\text{NO}_6\text{P} \quad (561.8)$
- 1223.) 1-O-(Z,Z)-9,15-heneicosadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $\text{C}_{31}\text{H}_{62}\text{NO}_6\text{P} \quad (575.83)$
- 1224.) 1-O-(Z,Z)-5,17-docosadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $\text{C}_{32}\text{H}_{64}\text{NO}_6\text{P} \quad (589.86)$
- 1225.) 1-O-(Z,Z)-6,18-tricosadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $\text{C}_{33}\text{H}_{66}\text{NO}_6\text{P} \quad (603.89)$

- 1226.) 1-O-(Z,Z)-6,18-tetracosadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{34}H_{68}NO_6P$  (617.92)
- 1227.) 1-O-(Z,Z)-6,18-pentacosadienyl-3-O-methyl-sn-glycero-2-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{35}H_{70}NO_6P$  (631.95)

1-O-(Z,Z)-Alkadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)

- 1228.) 1-O-(Z,Z)-6,12-hexadecadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{28}H_{56}NO_6P$  (533.73)
- 1229.) 1-O-(Z,Z)-6,12-heptadecadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{29}H_{58}NO_6P$  (547.76)
- 1230.) 1-O-(Z,Z)-6,12-octadecadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{30}H_{60}NO_6P$  (561.78)
- 1231.) 1-O-(Z,Z)-6,12-nonadecadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{31}H_{62}NO_6P$  (575.81)
- 1232.) 1-O-(Z,Z)-9,15-eicosadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{32}H_{64}NO_6P$  (589.84)
- 1233.) 1-O-(Z,Z)-9,15-heneicosadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{33}H_{66}NO_6P$  (603.87)
- 1234.) 1-O-(Z,Z)-5,17-docosadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{34}H_{68}NO_6P$  (617.9)
- 1235.) 1-O-(Z,Z)-6,18-tricosadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)  
 $C_{35}H_{70}NO_6P$  (631.93)
- 1236.) 1-O-(Z,Z)-6,18-tetracosadienyl-2-O-tert-butyl-sn-glycero-3-phosphocholine (n = 2)

- $C_{36}H_{72}NO_6P$  (645.96)  
1237.) 1-O-(Z,Z)-6,18-pentacosadienyl-2-O-tert-butyl-  
sn-glycero-3-phosphocholine (n = 2)  
 $C_{37}H_{74}NO_6P$  (660.03)

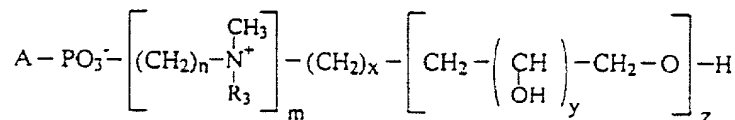
1-O-(Z,Z)-Alkadienyl-2-O-tert-butyl-sn-glycero-3-  
phospho-N,N,N-trimethylpropylammonium compounds

- 1238.) 1-O-(Z,Z)-6,12-hexadecadienyl-2-O-tert-butyl-  
sn-glycero-3-phospho-N,N,N-trimethylpropyl-  
ammonium (n = 3)  
 $C_{29}H_{58}NO_6P$  (547.76)  
1239.) 1-O-(Z,Z)-6,12-heptadecadienyl-2-O-tert-butyl-  
sn-glycero-3-phospho-N,N,N-trimethylpropyl-  
ammonium (n = 3)  
 $C_{30}H_{60}NO_6P$  (561.78)  
1240.) 1-O-(Z,Z)-6,12-octadecadienyl-2-O-tert-butyl-  
sn-glycero-3-phospho-N,N,N-trimethylpropyl-  
ammonium (n = 3)  
 $C_{31}H_{62}NO_6P$  (575.81)  
1241.) 1-O-(Z,Z)-6,12-nonadecadienyl-2-O-tert-butyl-  
sn-glycero-3-phospho-N,N,N-trimethylpropyl-  
ammonium (n = 3)  
 $C_{32}H_{64}NO_6P$  (589.84)  
1242.) 1-O-(Z,Z)-9,15-eicosadienyl-2-O-tert-butyl-sn-  
glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{33}H_{66}NO_6P$  (603.87)  
1243.) 1-O-(Z,Z)-9,15-heneicosadienyl-2-O-tert-butyl-  
sn-glycero-3-phospho-N,N,N-trimethylpropyl-  
ammonium (n = 3)  
 $C_{34}H_{68}NO_6P$  (617.9)  
1244.) 1-O-(Z,Z)-5,17-docosadienyl-2-O-tert-butyl-sn-  
glycero-3-phospho-N,N,N-trimethylpropylammonium  
(n = 3)  
 $C_{35}H_{70}NO_6P$  (631.93)

- 1245.) 1-O-(Z,Z)-6,18-tricosadienyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{36}H_{72}NO_6P$  (645.96)
- 1246.) 1-O-(Z,Z)-6,18-tetracosadienyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{37}H_{74}NO_6P$  (660.03)
- 1247.) 1-O-(Z,Z)-6,18-pentacosadienyl-2-O-tert-butyl-sn-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{38}H_{76}NO_6P$  (674.03)

**12. Active ingredients based on alkanediol-phospho compounds - monounsaturated compounds**

(A = VI or VII; n = 2-6;  $R_3$ ,  $CH_3$ ; m = 1, x = 1; z = 0)



**1-O-(Z)-Alkenylpropanediol-(1,2)-phosphocholines**

- 1248.) 1-O-(Z)-10-octadecenylpropanediol-(1,2)-phosphocholine  
 $C_{26}H_{54}NO_5P$  (491.68)
- 1249.) 1-O-(Z)-6-nonadecenylpropanediol-(1,2)-phosphocholine  
 $C_{27}H_{56}NO_5P$  (505.71)
- 1250.) 1-O-(Z)-12-eicosenylpropanediol-(1,2)-phosphocholine  
 $C_{28}H_{58}NO_5P$  (519.74)
- 1251.) 1-O-(Z)-10-heneicosenylpropanediol-(1,2)-phosphocholine  
 $C_{29}H_{60}NO_5P$  (533.77)
- 1252.) 1-O-(Z)-10-docosenylpropanediol-(1,2)-phosphocholine  
 $C_{30}H_{62}NO_5P$  (547.80)

- 1253.) 1-O-(Z)-12-docosenylpropanediol-(1,2)-  
phosphocholine  
 $C_{30}H_{62}NO_5P$  (547.80)
- 1254.) 1-O-(Z)-10-tricosenylpropanediol-(1,2)-  
phosphocholine  
 $C_{31}H_{64}NO_5P$  (561.83)
- 1255.) 1-O-(Z)-10-tetracosenylpropanediol-(1,2)-  
phosphocholine  
 $C_{32}H_{66}NO_5P$  (575.86)

1-O-(Z)-Alkenylpropanediol-(1,2)-phospho-N,N,N-  
trimethylpropylammonium compounds

- 1256.) 1-O-(Z)-10-octadecenylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
 $C_{27}H_{56}NO_5P$  (505.71)
- 1257.) 1-O-(Z)-6-nonadecenylpropanediol-(1,2)-phospho-  
N,N,N-trimethylpropylammonium  
 $C_{28}H_{58}NO_5P$  (519.74)
- 1258.) 1-O-(Z)-12-eicosenylpropanediol-(1,2)-phospho-  
N,N,N-trimethylpropylammonium  
 $C_{29}H_{60}NO_5P$  (533.77)
- 1259.) 1-O-(Z)-10-heneicosenylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
 $C_{30}H_{62}NO_5P$  (547.80)
- 1260.) 1-O-(Z)-10-docosenylpropanediol-(1,2)-phospho-  
N,N,N-trimethylpropylammonium  
 $C_{31}H_{64}NO_5P$  (561.83)
- 1261.) 1-O-(Z)-12-docosenylpropanediol-(1,2)-phospho-  
N,N,N-trimethylpropylammonium  
 $C_{31}H_{64}NO_5P$  (561.83)
- 1262.) 1-O-(Z)-10-tricosenylpropanediol-(1,2)-phospho-  
N,N,N-trimethylpropylammonium  
 $C_{32}H_{66}NO_5P$  (575.86)
- 1263.) 1-O-(Z)-10-tetracosenylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
 $C_{33}H_{68}NO_5P$  (589.89)

2-O-(Z)-Alkenylpropanediol-(1,2)-phosphocholines

- 1264.) 2-O-(Z)-10-octadecenylpropanediol-(1,2)-  
phosphocholine  
 $C_{26}H_{54}NO_5P$  (491.68)
- 1265.) 2-O-(Z)-6-nonadecenylpropanediol-(1,2)-  
phosphocholine  
 $C_{27}H_{56}NO_5P$  (505.71)
- 1266.) 2-O-(Z)-12-eicosenylpropanediol-(1,2)-  
phosphocholine  
 $C_{28}H_{58}NO_5P$  (519.74)
- 1267.) 2-O-(Z)-10-heneicosenylpropanediol-(1,2)-  
phosphocholine  
 $C_{29}H_{60}NO_5P$  (533.77)
- 1268.) 2-O-(Z)-10-docosenylpropanediol-(1,2)-  
phosphocholine  
 $C_{30}H_{62}NO_5P$  (547.80)
- 1269.) 2-O-(Z)-12-docosenylpropanediol-(1,2)-  
phosphocholine  
 $C_{30}H_{62}NO_5P$  (547.80)
- 1270.) 2-O-(Z)-10-tricosenylpropanediol-(1,2)-  
phosphocholine  
 $C_{31}H_{64}NO_5P$  (561.83)
- 1271.) 2-O-(Z)-10-tetracosenylpropanediol-(1,2)-  
phosphocholine  
 $C_{32}H_{66}NO_5P$  (575.86)

2-O-(Z)-Alkenylpropanediol-(1,2)-phospho-N,N,N-trimethylpropylammonium compounds

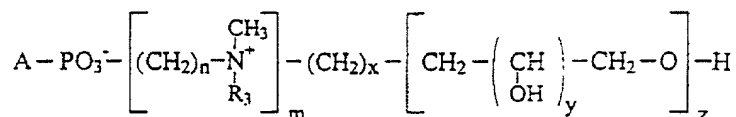
- 1272.) 2-O-(Z)-10-octadecenylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
 $C_{27}H_{56}NO_5P$  (505.71)
- 1273.) 2-O-(Z)-6-nonadecenylpropanediol-(1,2)-phospho-  
N,N,N-trimethylpropylammonium  
 $C_{28}H_{58}NO_5P$  (519.74)
- 1274.) 2-O-(Z)-12-eicosenylpropanediol-(1,2)-phospho-  
N,N,N-trimethylpropylammonium



- $C_{29}H_{60}NO_5P$  (533.77)  
 1275.) 2-O-(Z)-10-heneicosenylpropanediol-(1,2)-  
 phospho-N,N,N-trimethylpropylammonium  
 $C_{30}H_{62}NO_5P$  (547.80)  
 1276.) 2-O-(Z)-10-docosenylpropanediol-(1,2)-phospho-  
 N,N,N-trimethylpropylammonium  
 $C_{31}H_{64}NO_5P$  (561.83)  
 1277.) 2-O-(Z)-12-docosenylpropanediol-(1,2)-phospho-  
 N,N,N-trimethylpropylammonium  
 $C_{31}H_{64}NO_5P$  (561.83)  
 1278.) 2-O-(Z)-10-tricosenylpropanediol-(1,2)-phospho-  
 N,N,N-trimethylpropylammonium  
 $C_{32}H_{66}NO_5P$  (575.86)  
 1279.) 2-O-(Z)-10-tetracosenylpropanediol-(1,2)-  
 phospho-N,N,N-trimethylpropylammonium  
 $C_{33}H_{68}NO_5P$  (589.89)

**13. Active ingredients based on alkanediol-phospho compounds - diunsaturated compounds**

(A = VI or VII; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)



**1-O-(Z,Z)-Alkadienylpropanediol-(1,2)-phosphocholines**

- 1280.) 1-O-(Z,Z)-6,12-hexadecadienylpropanediol-(1,2)-  
 phosphocholine  
 $C_{24}H_{48}NO_5P$  (461.62)  
 1281.) 1-O-(Z,Z)-6,12-heptadecadienylpropanediol-  
 (1,2)-phosphocholine  
 $C_{25}H_{50}NO_5P$  (475.65)  
 1282.) 1-O-(Z,Z)-6,12-octadecadienylpropanediol-(1,2)-  
 phosphocholine  
 $C_{26}H_{52}NO_5P$  (489.68)  
 1283.) 1-O-(Z,Z)-6,12-nonadecadienylpropanediol-(1,2)-  
 phosphocholine

- C<sub>27</sub>H<sub>54</sub>NO<sub>5</sub>P (503.71)  
1284.) 1-O-(Z,Z)-9,15-eicosadienylpropanediol-(1,2)-  
phosphocholine  
C<sub>28</sub>H<sub>56</sub>NO<sub>5</sub>P (517.74)  
1285.) 1-O-(Z,Z)-9,15-heneicosadienylpropanediol-  
(1,2)-phosphocholine  
C<sub>29</sub>H<sub>58</sub>NO<sub>5</sub>P (531.77)  
1286.) 1-O-(Z,Z)-5,17-docosadienylpropanediol-(1,2)-  
phosphocholine  
C<sub>30</sub>H<sub>60</sub>NO<sub>5</sub>P (545.8)  
1287.) 1-O-(Z,Z)-6,18-tricosadienylpropanediol-(1,2)-  
phosphocholine  
C<sub>31</sub>H<sub>62</sub>NO<sub>5</sub>P (559.83)  
1288.) 1-O-(Z,Z)-6,18-tetracosadienylpropanediol-  
(1,2)-phosphocholine  
C<sub>32</sub>H<sub>64</sub>NO<sub>5</sub>P (573.86)  
1289.) 1-O-(Z,Z)-6,18-pentacosadienylpropanediol-  
(1,2)-phosphocholine  
C<sub>33</sub>H<sub>66</sub>NO<sub>5</sub>P (587.89)

1-O-(Z,Z)-Alkadienylpropanediol-(1,2)-phospho-N,N,N-  
trimethylpropylammonium compounds

- 1290.) 1-O-(Z,Z)-6,12-hexadecadienylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
C<sub>25</sub>H<sub>50</sub>NO<sub>5</sub>P (475.65)  
1291.) 1-O-(Z,Z)-6,12-heptadecadienylpropanediol-  
(1,2)-phospho-N,N,N-trimethylpropylammonium  
C<sub>26</sub>H<sub>52</sub>NO<sub>5</sub>P (489.68)  
1292.) 1-O-(Z,Z)-6,12-octadecadienylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
C<sub>27</sub>H<sub>54</sub>NO<sub>5</sub>P (503.71)  
1293.) 1-O-(Z,Z)-6,12-nonadecadienylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
C<sub>28</sub>H<sub>56</sub>NO<sub>5</sub>P (517.74)  
1294.) 1-O-(Z,Z)-9,15-eicosadienylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
C<sub>29</sub>H<sub>58</sub>NO<sub>5</sub>P (531.77)

- 1295.) 1-O-(Z,Z)-9,15-heneicosadienylpropanediol-  
(1,2)-phospho-N,N,N-trimethylpropylammonium  
 $C_{30}H_{60}NO_5P$  (545.8)
- 1296.) 1-O-(Z,Z)-5,17-docosadienylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
 $C_{31}H_{62}NO_5P$  (559.83)
- 1297.) 1-O-(Z,Z)-6,18-tricosadienylpropanediol-(1,2)-  
phospho-N,N,N-trimethylpropylammonium  
 $C_{32}H_{64}NO_5P$  (573.86)
- 1298.) 1-O-(Z,Z)-6,18-tetracosadienylpropanediol-  
(1,2)-phospho-N,N,N-trimethylpropylammonium  
 $C_{33}H_{66}NO_5P$  (587.89)
- 1299.) 1-O-(Z,Z)-6,18-pentacosadienylpropanediol-  
(1,2)-phospho-N,N,N-trimethylpropylammonium  
 $C_{34}H_{68}NO_5P$  (601.92)

2-O-(Z,Z)-Alkadienylpropanediol-(1,2)-phosphocholines

- 1300.) 2-O-(Z,Z)-6,12-hexadecadienylpropanediol-(1,2)-  
phosphocholine  
 $C_{24}H_{48}NO_5P$  (461.62)
- 1301.) 2-O-(Z,Z)-6,12-heptadecadienylpropanediol-  
(1,2)-phosphocholine  
 $C_{25}H_{50}NO_5P$  (475.65)
- 1302.) 2-O-(Z,Z)-6,12-octadecadienylpropanediol-(1,2)-  
phosphocholine  
 $C_{26}H_{52}NO_5P$  (489.68)
- 1303.) 2-O-(Z,Z)-6,12-nonadecadienylpropanediol-(1,2)-  
phosphocholine  
 $C_{27}H_{54}NO_5P$  (503.71)
- 1304.) 2-O-(Z,Z)-9,15-eicosadienylpropanediol-(1,2)-  
phosphocholine  
 $C_{28}H_{56}NO_5P$  (517.74)
- 1305.) 2-O-(Z,Z)-9,15-heneicosadienylpropanediol-  
(1,2)-phosphocholine  
 $C_{29}H_{58}NO_5P$  (531.77)
- 1306.) 2-O-(Z,Z)-5,17-docosadienylpropanediol-(1,2)-  
phosphocholine

- C<sub>30</sub>H<sub>60</sub>NO<sub>5</sub>P (545.8)
- 1307.) 2-O- (Z,Z) -6,18-tricosadienylpropanediol- (1,2) -  
phosphocholine  
C<sub>31</sub>H<sub>62</sub>NO<sub>5</sub>P (559.83)
- 1308.) 2-O- (Z,Z) -6,18-tetracosadienylpropanediol-  
(1,2) -phosphocholine  
C<sub>32</sub>H<sub>64</sub>NO<sub>5</sub>P (573.86)
- 1309.) 2-O- (Z,Z) -6,18-pentacosadienylpropanediol-  
(1,2) -phosphocholine  
C<sub>33</sub>H<sub>66</sub>NO<sub>5</sub>P (587.89)

2-O- (Z,Z) -Alkadienylpropanediol- (1,2) -phospho-N,N,N-  
trimethylpropylammonium compounds

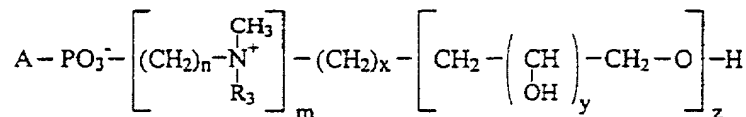
- 1310.) 2-O- (Z,Z) -6,12-hexadecadienylpropanediol- (1,2) -  
phospho-N,N,N-trimethylpropylammonium  
C<sub>25</sub>H<sub>50</sub>NO<sub>5</sub>P (475.65)
- 1311.) 2-O- (Z,Z) -6,12-heptadecadienylpropanediol-  
(1,2) -phospho-N,N,N-trimethylpropylammonium  
C<sub>26</sub>H<sub>52</sub>NO<sub>5</sub>P (489.68)
- 1312.) 2-O- (Z,Z) -6,12-octadecadienylpropanediol- (1,2) -  
phospho-N,N,N-trimethylpropylammonium  
C<sub>27</sub>H<sub>54</sub>NO<sub>5</sub>P (503.71)
- 1313.) 2-O- (Z,Z) -6,12-nonadecadienylpropanediol- (1,2) -  
phospho-N,N,N-trimethylpropylammonium  
C<sub>28</sub>H<sub>56</sub>NO<sub>5</sub>P (517.74)
- 1314.) 2-O- (Z,Z) -9,15-eicosadienylpropanediol- (1,2) -  
phospho-N,N,N-trimethylpropylammonium  
C<sub>29</sub>H<sub>58</sub>NO<sub>5</sub>P (531.77)
- 1315.) 2-O- (Z,Z) -9,15-heneicosadienylpropanediol-  
(1,2) -phospho-N,N,N-trimethylpropylammonium  
C<sub>30</sub>H<sub>60</sub>NO<sub>5</sub>P (545.8)
- 1316.) 2-O- (Z,Z) -5,17-docosadienylpropanediol- (1,2) -  
phospho-N,N,N-trimethylpropylammonium  
C<sub>31</sub>H<sub>62</sub>NO<sub>5</sub>P (559.83)
- 1317.) 2-O- (Z,Z) -6,18-tricosadienylpropanediol- (1,2) -  
phospho-N,N,N-trimethylpropylammonium  
C<sub>32</sub>H<sub>64</sub>NO<sub>5</sub>P (573.86)

- 1318.) 2-O-(Z,Z)-6,18-tetracosadienylpropanediol-  
(1,2)-phospho-N,N,N-trimethylpropylammonium  
 $C_{33}H_{66}NO_5P$  (587.89)
- 1319.) 2-O-(Z,Z)-6,18-pentacosadienylpropanediol-  
(1,2)-phospho-N,N,N-trimethylpropylammonium  
 $C_{34}H_{68}NO_5P$  (601.92)

Solubilizers
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1. Examples of single-chain glycerophospho-N,N-dimethyl-N-dihydroxypropylalkylammonium compounds

(A = III or IV; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 0; y = 1; z = 1)



n = 2

- 1320.) 1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{26}H_{52}NO_9P$  (553.67)
- 1321.) 1-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{27}H_{54}NO_9P$  (567.70)
- 1322.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{28}H_{56}NO_9P$  (581.73)
- 1323.) 1-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{29}H_{58}NO_9P$  (595.75)
- 1324.) 1-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{30}H_{60}NO_9P$  (609.78)
- 1325.) 1-(Z)-10-heneicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)

- C<sub>31</sub>H<sub>62</sub>NO<sub>9</sub>P (623.81)
- 1326.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>32</sub>H<sub>64</sub>NO<sub>9</sub>P (637.84)
- 1327.) 1-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>32</sub>H<sub>64</sub>NO<sub>9</sub>P (637.84)
- 1328.) 1-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>33</sub>H<sub>66</sub>NO<sub>9</sub>P (651.86)
- 1329.) 1-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>34</sub>H<sub>68</sub>NO<sub>9</sub>P (665.89)
- 1330.) 1-(Z)-15-pentacosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>35</sub>H<sub>70</sub>NO<sub>9</sub>P (679.92)
- 1331.) 1-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>36</sub>H<sub>72</sub>NO<sub>9</sub>P (693.94)
- 1332.) 1-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>26</sub>H<sub>50</sub>NO<sub>9</sub>P (551.66)
- 1333.) 1-(Z,Z)-5,11-heptadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>27</sub>H<sub>52</sub>NO<sub>9</sub>P (565.68)
- 1334.) 1-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>28</sub>H<sub>54</sub>NO<sub>9</sub>P (579.71)
- 1335.) 1-(Z,Z)-6,12-nonadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
C<sub>29</sub>H<sub>56</sub>NO<sub>9</sub>P (593.74)

- 1336.) 1-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{30}H_{58}NO_9P$  (607.77)
- 1337.) 1-(Z,Z)-10,16-heneicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{31}H_{60}NO_9P$  (621.79)
- 1338.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{32}H_{62}NO_9P$  (635.82)
- 1339.) 1-(Z,Z)-10,16-tricosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{33}H_{64}NO_9P$  (649.85)
- 1340.) 1-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{34}H_{66}NO_9P$  (663.87)
- 1341.) 1-(Z,Z)-10,16-pentacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{35}H_{68}NO_9P$  (677.90)
- 1342.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{36}H_{70}NO_9P$  (691.93)

#### Alkenyl

- 1343.) 1-O-(Z)-6-hexadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{26}H_{54}NO_8P$  (539.69)
- 1344.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{28}H_{58}NO_8P$  (567.74)
- 1345.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)

- $C_{30}H_{62}NO_8P$  (595.80)  
1346.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{32}H_{66}NO_8P$  (623.85)  
1347.) 1-O-(Z)-10-tetracosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{34}H_{70}NO_8P$  (651.91)  
1348.) 1-O-(Z)-16-hexacosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{36}H_{74}NO_8P$  (679.96)  
1349.) 1-O-(Z,Z)-5,11-hexadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{26}H_{52}NO_8P$  (537.67)  
1350.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{28}H_{56}NO_8P$  (565.73)  
1351.) 1-O-(Z,Z)-10,16-eicosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{30}H_{60}NO_8P$  (593.78)  
1352.) 1-O-(Z,Z)-10,16-docosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{32}H_{64}NO_8P$  (621.84)  
1353.) 1-O-(Z,Z)-6,18-tetracosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{34}H_{68}NO_8P$  (649.89)  
1354.) 1-O-(Z,Z)-6,18-hexacosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{36}H_{72}NO_8P$  (677.94)



n = 3

- 1355.) 1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)  
 $C_{27}H_{54}NO_9P$  (567.70)
- 1356.) 1-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)  
 $C_{28}H_{56}NO_9P$  (581.73)
- 1357.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)  
 $C_{29}H_{58}NO_9P$  (595.75)
- 1358.) 1-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)  
 $C_{31}H_{62}NO_9P$  (623.81)
- 1359.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)  
 $C_{33}H_{66}NO_9P$  (651.86)
- 1360.) 1-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)  
 $C_{33}H_{66}NO_9P$  (651.86)
- 1361.) 1-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)  
 $C_{34}H_{68}NO_9P$  (665.89)
- 1362.) 1-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)  
 $C_{35}H_{70}NO_9P$  (679.92)
- 1363.) 1-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{27}H_{52}NO_9P$  (565.68)

- 1364.) 1-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{29}H_{56}NO_9P$  (593.74)
- 1365.) 1-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{31}H_{60}NO_9P$  (621.79)
- 1366.) 1-(Z,Z)-10,16-heneicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{32}H_{62}NO_9P$  (635.82)
- 1367.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{33}H_{64}NO_9P$  (649.85)
- 1368.) 1-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{35}H_{68}NO_9P$  (677.90)
- 1369.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{37}H_{72}NO_9P$  (705.95)
- 1370.) 1-O-(Z)-6-hexadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{27}H_{56}NO_8P$  (553.72)
- 1371.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{29}H_{60}NO_8P$  (581.77)
- 1372.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{31}H_{64}NO_8P$  (609.83)

- 1373.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)

$C_{33}H_{68}NO_8P$  (637.88)

- 1374.) 1-O-(Z)-10-tetracosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)

$C_{35}H_{72}NO_8P$  (665.94)

- 1375.) 1-O-(Z,Z)-5,11-hexadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)

$C_{27}H_{54}NO_8P$  (551.7)

- 1376.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)

$C_{29}H_{58}NO_8P$  (579.76)

- 1377.) 1-O-(Z,Z)-10,16-eicosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)

$C_{31}H_{62}NO_8P$  (607.81)

- 1378.) 1-O-(Z,Z)-10,16-docosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)

$C_{33}H_{66}NO_8P$  (635.87)

- 1379.) 1-O-(Z,Z)-6,18-tetracosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)

$C_{35}H_{70}NO_8P$  (663.92)

- 1380.) 1-O-(Z,Z)-6,18-hexacosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)

$C_{37}H_{74}NO_8P$  (691.97)

n = 4

- 1381.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)

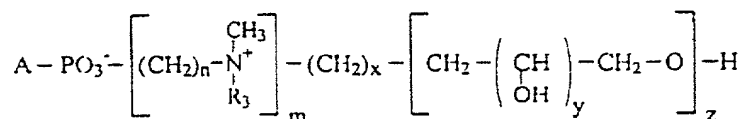
$C_{30}H_{60}NO_9P$  (609.78)

- 1382.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)  
 $C_{34}H_{68}NO_9P$  (665.89)
- 1383.) 1-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)  
 $C_{28}H_{54}NO_9P$  (579.71)
- 1384.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)  
 $C_{34}H_{66}NO_9P$  (663.88)
- 1385.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)  
 $C_{38}H_{74}NO_9P$  (719.98)
- 1386.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)  
 $C_{30}H_{62}NO_8P$  (595.80)
- 1387.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)  
 $C_{34}H_{70}NO_8P$  (651.91)
- 1388.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)  
 $C_{30}H_{60}NO_8P$  (593.78)
- 1389.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)  
 $C_{32}H_{66}NO_8P$  (623.85)
- n = 6
- 1390.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium (n = 6)  
 $C_{32}H_{64}NO_9P$  (637.84)
- 1391.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium (n = 6)  
 $C_{36}H_{72}NO_9P$  (693.94)

- 1392.) 1-(Z,Z)-5-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium  
(n = 6)  
C<sub>30</sub>H<sub>58</sub>NO<sub>9</sub>P (607.77)
- 1393.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium (n = 6)  
C<sub>36</sub>H<sub>70</sub>NO<sub>9</sub>P (691.93)
- 1394.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium (n = 6)  
C<sub>40</sub>H<sub>78</sub>NO<sub>9</sub>P (748.03)
- 1395.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium (n = 6)  
C<sub>32</sub>H<sub>66</sub>NO<sub>8</sub>P (623.85)
- 1396.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium (n = 6)  
C<sub>36</sub>H<sub>74</sub>NO<sub>8</sub>P (679.96)
- 1397.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium (n = 6)  
C<sub>32</sub>H<sub>64</sub>NO<sub>8</sub>P (621.84)
- 1398.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium (n = 6)  
C<sub>34</sub>H<sub>70</sub>NO<sub>8</sub>P (651.91)

2. Examples of single-chain glycerophospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)alkylammonium compounds

(A = III or IV; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 0; y = 1; z = 2)



n = 2

- 1399.) 1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{28}H_{58}NO_{11}P$  (627.75)
- 1400.) 1-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{32}H_{64}NO_{11}P$  (669.83)
- 1401.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{35}H_{70}NO_{11}P$  (711.91)
- 1402.) 1-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{35}H_{70}NO_{11}P$  (711.91)
- 1403.) 1-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{37}H_{74}NO_{11}P$  (739.97)
- 1404.) 1-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{39}H_{78}NO_{11}P$  (768.02)
- 1405.) 1-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{29}H_{56}NO_{11}P$  (625.74)
- 1406.) 1-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{31}H_{60}NO_{11}P$  (653.79)
- 1407.) 1-(Z,Z)-10,16-heneicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{34}H_{66}NO_{11}P$  (695.87)

- 1408.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>35</sub>H<sub>68</sub>NO<sub>11</sub>P (709.90)
- 1409.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>39</sub>H<sub>76</sub>NO<sub>11</sub>P (766.01)

## Alkenyl

- 1410.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>31</sub>H<sub>64</sub>NO<sub>10</sub>P (641.82)
- 1411.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>33</sub>H<sub>68</sub>NO<sub>10</sub>P (669.88)
- 1412.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>35</sub>H<sub>72</sub>NO<sub>10</sub>P (697.93)
- 1413.) 1-O-(Z)-10-tetracosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>37</sub>H<sub>76</sub>NO<sub>10</sub>P (725.98)
- 1414.) 1-O-(Z)-16-hexacosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>39</sub>H<sub>80</sub>NO<sub>10</sub>P (754.04)
- 1415.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>31</sub>H<sub>62</sub>NO<sub>10</sub>P (639.81)
- 1416.) 1-O-(Z,Z)-6,18-tetracosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>37</sub>H<sub>74</sub>NO<sub>10</sub>P (723.97)

1417.) 1-O-(Z,Z)-6,18-hexacosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{39}H_{78}NO_{10}P$  (752.04)

n = 3

1418.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{32}H_{64}NO_{11}P$  (669.83)

1419.) 1-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{34}H_{68}NO_{11}P$  (697.89)

1420.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{36}H_{72}NO_{11}P$  (725.94)

1421.) 1-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{36}H_{72}NO_{11}P$  (725.94)

1422.) 1-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{38}H_{76}NO_{11}P$  (754.0)

1423.) 1-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{32}H_{62}NO_{11}P$  (667.83)

1424.) 1-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{34}H_{66}NO_{11}P$  (695.89)

1425.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)



- $C_{36}H_{70}NO_{11}P$  (723.94)
- 1426.) 1-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)
- $C_{38}H_{74}NO_{11}P$  (751.98)
- 1427.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)
- $C_{40}H_{78}NO_{11}P$  (780.03)
- 1428.) 1-O-(Z)-6-hexadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)
- $C_{30}H_{62}NO_{10}P$  (627.80)
- 1429.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)
- $C_{36}H_{74}NO_{10}P$  (711.96)
- 1430.) 1-O-(Z)-10-tetracosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)
- $C_{38}H_{78}NO_{10}P$  (740.01)
- 1431.) 1-O-(Z,Z)-5,11-hexadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)
- $C_{30}H_{60}NO_{10}P$  (625.78)
- 1432.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)
- $C_{32}H_{64}NO_{10}P$  (653.83)
- 1433.) 1-O-(Z,Z)-10,16-eicosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)
- $C_{34}H_{68}NO_{10}P$  (681.89)
- 1434.) 1-O-(Z,Z)-6,18-tetracosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)
- $C_{38}H_{76}NO_{10}P$  (738.0)

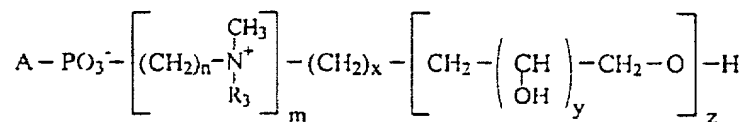
- 1435.) 1-O-(Z,Z)-6,18-hexacosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
C<sub>40</sub>H<sub>80</sub>NO<sub>10</sub>P (766.05)
- n = 4
- 1436.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>33</sub>H<sub>66</sub>NO<sub>11</sub>P (683.86)
- 1437.) 1-(Z)-6-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>37</sub>H<sub>74</sub>NO<sub>11</sub>P (739.97)
- 1438.) 1-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>31</sub>H<sub>60</sub>NO<sub>11</sub>P (653.79)
- 1439.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>37</sub>H<sub>72</sub>NO<sub>11</sub>P (737.95)
- 1440.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>41</sub>H<sub>80</sub>NO<sub>11</sub>P (794.06)
- 1441.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>33</sub>H<sub>68</sub>NO<sub>10</sub>P (669.88)
- 1442.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>37</sub>H<sub>76</sub>NO<sub>10</sub>P (725.98)
- 1443.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)

- $C_{33}H_{66}NO_{10}P$  (667.86)
- 1444.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)
- $C_{35}H_{72}NO_{10}P$  (697.93)
- n = 6
- 1445.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)
- $C_{35}H_{70}NO_{11}P$  (711.91)
- 1446.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)
- $C_{39}H_{78}NO_{11}P$  (768.02)
- 1447.) 1-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)
- $C_{33}H_{64}NO_{11}P$  (681.85)
- 1448.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)
- $C_{39}H_{76}NO_{11}P$  (766.01)
- 1449.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)
- $C_{43}H_{84}NO_{11}P$  (822.11)
- 1450.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)
- $C_{35}H_{72}NO_{10}P$  (697.93)
- 1451.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)
- $C_{39}H_{80}NO_{10}P$  (754.04)

- 1452.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)  
 $C_{35}H_{70}NO_{10}P$  (695.92)
- 1453.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)  
 $C_{37}H_{76}NO_{10}P$  (725.98)

3. Examples of single-chain glycerophospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-2-hydroxypropyl-3,1-O,O-dihydroxypropyl)alkylammonium compounds

(A = III or IV; n = 2-6;  $R_3$ ,  $CH_3$ ; m = 1, x = 0; y = 1; z = 3)



In the following text, N-(2-hydroxypropyl-3,1-O,O-2-hydroxypropyl-3,1-O,O-dihydroxypropyl) is abbreviated to N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)

n = 2

- 1454.) 1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
 $C_{32}H_{64}NO_{13}P$  (701.83)
- 1455.) 1-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
 $C_{35}H_{70}NO_{13}P$  (743.91)
- 1456.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
 $C_{38}H_{76}NO_{13}P$  (785.99)
- 1457.) 1-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
 $C_{38}H_{76}NO_{13}P$  (785.99)
- 1458.) 1-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
 $C_{42}H_{84}NO_{13}P$  (842.10)

- 1459.) 1-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>32</sub>H<sub>62</sub>NO<sub>13</sub>P (699.82)
- 1460.) 1-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>34</sub>H<sub>66</sub>NO<sub>13</sub>P (727.87)
- 1461.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>38</sub>H<sub>74</sub>NO<sub>13</sub>P (783.98)
- 1462.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>42</sub>H<sub>82</sub>NO<sub>13</sub>P (840.09)

#### Alkenyl

- 1463.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>34</sub>H<sub>70</sub>NO<sub>12</sub>P (715.90)
- 1464.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>36</sub>H<sub>74</sub>NO<sub>12</sub>P (743.96)
- 1465.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>38</sub>H<sub>78</sub>NO<sub>12</sub>P (772.01)
- 1466.) 1-O-(Z)-16-hexacosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>42</sub>H<sub>86</sub>NO<sub>12</sub>P (828.12)
- 1467.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>34</sub>H<sub>68</sub>NO<sub>12</sub>P (713.89)

- 1468.) 1-O-(Z,Z)-6,18-hexacosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>42</sub>H<sub>84</sub>NO<sub>12</sub>P (826.10)
- n = 3
- 1469.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>35</sub>H<sub>70</sub>NO<sub>13</sub>P (743.91)
- 1470.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>39</sub>H<sub>78</sub>NO<sub>13</sub>P (800.02)
- 1471.) 1-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>41</sub>H<sub>82</sub>NO<sub>13</sub>P (828.07)
- 1472.) 1-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>35</sub>H<sub>68</sub>NO<sub>13</sub>P (741.90)
- 1473.) 1-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>37</sub>H<sub>72</sub>NO<sub>13</sub>P (769.95)
- 1474.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>39</sub>H<sub>76</sub>NO<sub>13</sub>P (798.01)
- 1475.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>43</sub>H<sub>84</sub>NO<sub>13</sub>P (854.11)
- 1476.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>39</sub>H<sub>80</sub>NO<sub>12</sub>P (786.04)

- 1477.) 1-O-(Z)-10-tetracosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>41</sub>H<sub>84</sub>NO<sub>12</sub>P (814.09)
- 1478.) 1-O-(Z,Z)-10,16-eicosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>37</sub>H<sub>74</sub>NO<sub>12</sub>P (812.08)
- 1479.) 1-O-(Z,Z)-6,18-tetracosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>41</sub>H<sub>82</sub>NO<sub>12</sub>P (812.08)
- 1480.) 1-O-(Z,Z)-6,18-hexacosadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>43</sub>H<sub>86</sub>NO<sub>12</sub>P (840.13)
- n = 4
- 1481.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)  
C<sub>40</sub>H<sub>80</sub>NO<sub>13</sub>P (814.05)
- 1482.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)  
C<sub>40</sub>H<sub>78</sub>NO<sub>13</sub>P (812.03)
- 1483.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)  
C<sub>44</sub>H<sub>86</sub>NO<sub>13</sub>P (868.14)
- 1484.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)  
C<sub>36</sub>H<sub>74</sub>NO<sub>12</sub>P (743.96)
- 1485.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)  
C<sub>40</sub>H<sub>82</sub>NO<sub>12</sub>P (800.06)

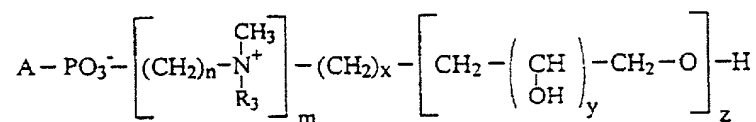
- 1486.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)  
C<sub>36</sub>H<sub>72</sub>NO<sub>12</sub>P (741.94)
- 1487.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)  
C<sub>38</sub>H<sub>78</sub>NO<sub>12</sub>P (772.01)
- n = 6
- 1488.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)  
C<sub>38</sub>H<sub>76</sub>NO<sub>13</sub>P (785.99)
- 1489.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)  
C<sub>42</sub>H<sub>84</sub>NO<sub>13</sub>P (842.10)
- 1490.) 1-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)  
C<sub>36</sub>H<sub>70</sub>NO<sub>13</sub>P (755.92)
- 1491.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)  
C<sub>42</sub>H<sub>82</sub>NO<sub>13</sub>P (840.09)
- 1492.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)  
C<sub>46</sub>H<sub>90</sub>NO<sub>13</sub>P (896.19)
- 1493.) 1-O-(Z)-6-octadecenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)  
C<sub>38</sub>H<sub>78</sub>NO<sub>12</sub>P (772.01)
- 1494.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)  
C<sub>42</sub>H<sub>86</sub>NO<sub>12</sub>P (828.12)
- 1495.) 1-O-(Z,Z)-5,11-octadecadienyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)



- $C_{38}H_{76}NO_{12}P$  (769.99)  
 1496.) 1-O-(Z)-12-eicosenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)  
 $C_{40}H_{82}NO_{12}P$  (800.06)

4. Examples of single-chain glycerophospho compounds not hydroxylated on the nitrogen

(A = III; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)

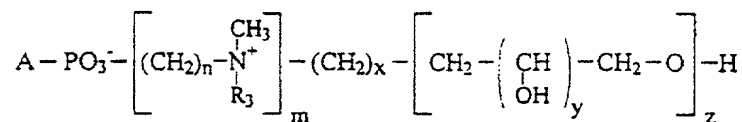


- 1497.) 1-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{27}H_{54}NO_7P$  (535.70)
- 1498.) 1-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{31}H_{62}NO_7P$  (591.81)
- 1499.) 1-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{33}H_{66}NO_7P$  (619.86)
- 1500.) 1-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{27}H_{52}NO_7P$  (533.69)
- 1501.) 1-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{29}H_{56}NO_7P$  (561.74)
- 1502.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{31}H_{60}NO_7P$  (589.79)
- 1503.) 1-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{35}H_{68}NO_7P$  (645.90)
- 1504.) 1-O-(Z)-10-docosenyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)

- $C_{31}H_{64}NO_6P$  (577.83)  
 1505.) 1-O-(Z)-10-tetracosenyl-*sn*-glycero-3-phospho-  
 N,N,N-trimethylpropylammonium ( $n = 3$ )  
 $C_{33}H_{68}NO_6P$  (605.88)  
 1506.) 1-O-(Z,Z)-10,16-eicosadienyl-*sn*-glycero-3-  
 phospho-N,N,N-trimethylpropylammonium ( $n = 3$ )  
 $C_{29}H_{58}NO_6P$  (547.76)  
 1507.) 1-O-(Z,Z)-6,18-tetracosadienyl-*sn*-glycero-3-  
 phospho-N,N,N-trimethylpropylammonium ( $n = 3$ )  
 $C_{33}H_{66}NO_6P$  (603.86)  
 1508.) 1-O-(Z,Z)-6,18-hexacosadienyl-*sn*-glycero-3-  
 phospho-N,N,N-trimethylpropylammonium ( $n = 3$ )  
 $C_{35}H_{70}NO_6P$  (631.92)

**5. Examples of  $\omega,\omega'$ -alkanediol-phospho-N,N-dimethyl-N-dihydroxypropylalkylammonium compounds**

(A = V;  $n = 2-6$ ;  $R_3$ ,  $CH_3$ ;  $m = 1$ ,  $x = 0$ ;  $y = 1$ ;  $z = 1$ )

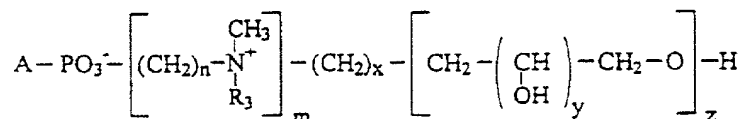


- 1509.) 1-(Z)-10-docosenoyl-ethyleneglycol-phospho-N,N-  
 dimethyl-N-dihydroxypropylethylammonium ( $n = 2$ )  
 $C_{31}H_{62}NO_8P$  (607.81)  
 1510.) 1-(Z)-6-octadecenoyl-propanediol-(1,3)-phospho-  
 N,N-dimethyl-N-dihydroxypropylethylammonium  
 ( $n = 2$ )  
 $C_{28}H_{56}NO_8P$  (565.73)  
 1511.) 1-(Z)-10-docosenoyl-propanediol-(1,3)-phospho-  
 N,N-dimethyl-N-dihydroxypropylethylammonium  
 ( $n = 2$ )  
 $C_{32}H_{64}NO_8P$  (621.84)  
 1512.) 1-(Z)-10-tetracosenoyl-propanediol-(1,3)-  
 phospho-N,N-dimethyl-N-dihydroxypropylethyl-  
 ammonium ( $n = 2$ )  
 $C_{34}H_{68}NO_8P$  (649.89)

- 1513.) 1-(Z,Z)-5,11-octadecadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{28}H_{54}NO_8P$  (563.71)
- 1514.) 1-(Z,Z)-10,16-eicosadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{30}H_{58}NO_8P$  (591.77)
- 1515.) 1-(Z,Z)-10,16-docosadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{32}H_{62}NO_8P$  (619.82)
- 1516.) 1-(Z,Z)-6,18-hexacosadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{36}H_{70}NO_8P$  (675.93)
- 1517.) 1-(Z)-10-docosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{33}H_{66}NO_8P$  (635.86)
- 1518.) 1-(Z)-10-docosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)  
 $C_{34}H_{68}NO_8P$  (649.89)

**6. Examples of alkanediol-(1,2)-phospho-N,N-dimethyl-N-dihydroxypropylalkylammonium compounds**

(A = VII; n = 2-6;  $R_3$ ,  $CH_3$ ; m = 1, x = 0; y = 1; z = 1)

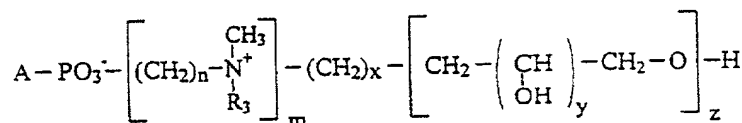


- 1519.) 2-(Z)-10-docosenoyl-propanediol-(1,2)-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)

- 1520.)  $C_{32}H_{64}NO_8P$  (621.84)  
1-(Z)-10-docosenoyl-propanediol-(1,2)-phospho-  
N,N-dimethyl-N-dihydroxypropylethylammonium  
(n = 2)
- 1521.)  $C_{32}H_{64}NO_8P$  (621.84)  
2-(Z)-10-docosenoyl-propanediol-(1,2)-phospho-  
N,N-dimethyl-N-dihydroxypropylpropylammonium  
(n = 3)
- 1522.)  $C_{33}H_{66}NO_8P$  (635.86)  
1-(Z)-10-docosenoyl-propanediol-(1,2)-phospho-  
N,N-dimethyl-N-dihydroxypropylbutylammonium  
(n = 4)
- $C_{34}H_{68}NO_8P$  (649.89)

7. Examples of  $\omega, \omega'$ -alkanediol-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)alkyl-ammonium compounds

(A = V; n = 2-6;  $R_3$ ,  $CH_3$ ; m = 1, x = 0; y = 1; z = 2)



- 1523.) 1-(Z)-10-docosenoyl-ethyleneglycol-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{34}H_{68}NO_{10}P$  (681.89)
- 1524.) 1-(Z)-6-octadecenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{31}H_{62}NO_{10}P$  (639.81)
- 1525.) 1-(Z)-10-docosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{35}H_{70}NO_{10}P$  (695.92)
- 1526.) 1-(Z)-10-tetracosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)



- 1527.) 1-(Z,Z)-5,11-octadecadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)



- 1528.) 1-(Z,Z)-10,16-eicosadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)



- 1529.) 1-(Z,Z)-10,16-docosadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)



- 1530.) 1-(Z,Z)-6,18-hexacosadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)



- 1531.) 1-(Z)-10-docosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)



- 1532.) 1-(Z)-10-docosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)



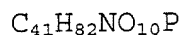
- 1533.) 1-(Z)-10-docosenoyl-butanediol-(1,4)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)



- 1534.) 1-(Z)-10-docosenoyl-hexanediol-(1,6)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)



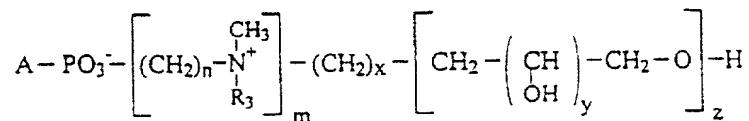
- 1535.) 1-(Z)-10-docosenoyl-octanediol-(1,8)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)



(780.07)

8. Examples of alkanediol-(1,2)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)-alkylammonium compounds

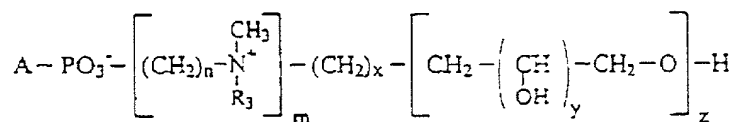
(A = VII; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 0; y = 1; z = 2)



- 1536.) 2-(Z)-10-docosenoyl-propanediol-(1,2)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>35</sub>H<sub>70</sub>NO<sub>10</sub>P (695.91)
- 1537.) 1-(Z)-10-docosenoyl-propanediol-(1,2)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>35</sub>H<sub>70</sub>NO<sub>10</sub>P (695.91)
- 1538.) 2-(Z)-10-docosenoyl-propanediol-(1,2)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
C<sub>36</sub>H<sub>72</sub>NO<sub>10</sub>P (709.94)
- 1539.) 1-(Z)-10-docosenoyl-propanediol-(1,2)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>37</sub>H<sub>74</sub>NO<sub>10</sub>P (723.97)
- 1540.) 1-(Z)-10-docosenoyl-butanediol-(1,2)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
C<sub>37</sub>H<sub>74</sub>NO<sub>10</sub>P (723.97)
- 1541.) 1-(Z)-10-docosenoyl-hexanediol-(1,2)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
C<sub>39</sub>H<sub>78</sub>NO<sub>10</sub>P (752.02)
- 1542.) 1-(Z)-10-docosenoyl-octanediol-(1,2)-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
C<sub>41</sub>H<sub>82</sub>NO<sub>10</sub>P (780.07)

9. Examples of  $\omega, \omega'$ -alkanediol-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,2-hydroxypropyl-3,1-O,2-dihydroxypropyl)alkylammonium compounds

(A = V; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 0; y = 1; z = 3)

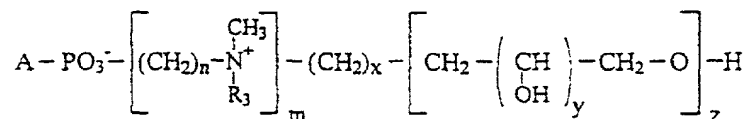


- 1543.) 1-(Z)-10-docosenoyl-ethyleneglycol-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>37</sub>H<sub>74</sub>NO<sub>12</sub>P (755.97)
- 1544.) 1-(Z)-6-octadecenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>34</sub>H<sub>68</sub>NO<sub>12</sub>P (713.89)
- 1545.) 1-(Z)-10-docosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>38</sub>H<sub>76</sub>NO<sub>12</sub>P (769.99)
- 1546.) 1-(Z)-10-tetracosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>40</sub>H<sub>80</sub>NO<sub>12</sub>P (798.05)
- 1547.) 1-(Z,Z)-5,11-octadecadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>34</sub>H<sub>66</sub>NO<sub>12</sub>P (711.89)
- 1548.) 1-(Z,Z)-10,16-eicosadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>36</sub>H<sub>70</sub>NO<sub>12</sub>P (739.93)
- 1549.) 1-(Z,Z)-10,16-docosadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>38</sub>H<sub>74</sub>NO<sub>12</sub>P (767.98)

- 1550.) 1-(Z,Z)-6,18-hexacosadienoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>42</sub>H<sub>82</sub>NO<sub>12</sub>P (824.09)
- 1551.) 1-(Z)-10-docosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>39</sub>H<sub>78</sub>NO<sub>12</sub>P (784.01)
- 1552.) 1-(Z)-10-docosenoyl-propanediol-(1,3)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)  
C<sub>40</sub>H<sub>80</sub>NO<sub>12</sub>P (798.04)
- 1553.) 1-(Z)-10-docosenoyl-butanediol-(1,4)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>40</sub>H<sub>80</sub>NO<sub>12</sub>P (798.04)
- 1554.) 1-(Z)-10-docosenoyl-hexanediol-(1,6)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>42</sub>H<sub>84</sub>NO<sub>12</sub>P (826.10)
- 1555.) 1-(Z)-10-docosenoyl-octanediol-(1,8)-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>44</sub>H<sub>88</sub>NO<sub>12</sub>P (854.16)

10. Examples of alkanediol-phospho compounds not hydroxylated on the nitrogen

(A = V; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)



- 1556.) 1-(Z)-10-docosenoyl-ethyleneglycol-phospho-N,N,N-trimethylpropylammonium (n = 3)



- 1557.)  $C_{30}H_{60}NO_6P$  (561.78)  
1- (Z) -6-octadecenoyl-propanediol- (1,3) -phospho-  
N,N,N-trimethylethylammonium (n = 2)  
 $C_{26}H_{52}NO_6P$  (505.68)
- 1558.) 1- (Z) -10-docosenoyl-propanediol- (1,3) -phospho-  
N,N,N-trimethylethylammonium (n = 2)  
 $C_{30}H_{60}NO_6P$  (561.78)
- 1559.) 1- (Z) -10-tetracosenoyl-propanediol- (1,3) -  
phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{33}H_{66}NO_6P$  (603.86)
- 1560.) 1- (Z,Z) -5,11-octadecadienoyl-propanediol- (1,3) -  
phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{27}H_{52}NO_6P$  (517.69)
- 1561.) 1- (Z,Z) -10,16-eicosadienoyl-propanediol- (1,3) -  
phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{29}H_{56}NO_6P$  (545.74)
- 1562.) 1- (Z,Z) -10,16-docosadienoyl-propanediol- (1,3) -  
phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{31}H_{60}NO_6P$  (573.79)
- 1563.) 1- (Z,Z) -6,18-hexacosadienoyl-propanediol- (1,3) -  
phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{35}H_{68}NO_6P$  (629.90)
- 1564.) 1- (Z) -10-docosenoyl-propanediol- (1,3) -phospho-  
N,N,N-trimethylpropylammonium (n = 3)  
 $C_{31}H_{62}NO_6P$  (575.81)
- 1565.) 1- (Z) -10-docosenoyl-propanediol- (1,3) -phospho-  
N,N,N-trimethylbutylammonium (n = 4)  
 $C_{32}H_{64}NO_6P$  (589.84)
- 1566.) 1- (Z) -10-docosenoyl-butanediol- (1,4) -phospho-  
N,N,N-trimethylpropylammonium (n = 3)  
 $C_{32}H_{64}NO_6P$  (589.84)
- 1567.) 1- (Z) -10-docosenoyl-hexanediol- (1,6) -phospho-  
N,N,N-trimethylpropylammonium (n = 3)  
 $C_{34}H_{68}NO_6P$  (617.89)

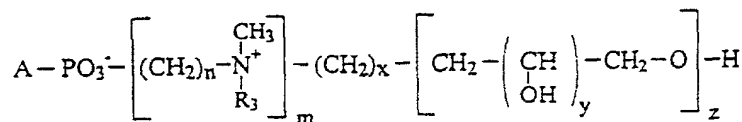
- 1568.) 1-(Z)-10-docosenoyl-octanediol-(1,8)-phospho-  
N,N,N-trimethylpropylammonium (n = 3)  
C<sub>36</sub>H<sub>72</sub>NO<sub>6</sub>P (645.94)

Liposome constituents

Neutral phospholipids

1. Examples of two-chain glycerophospho-N,N-dimethyl-N-dihydroxypropylalkylammonium compounds

(A = III; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 0; y = 1; z = 1)



n = 2

- 1569.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-dihydroxypropylethylammonium  
(n = 2)  
C<sub>42</sub>H<sub>80</sub>NO<sub>10</sub>P (790.07)
- 1570.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-dihydroxypropylethyl-  
ammonium (n = 2)  
C<sub>44</sub>H<sub>84</sub>NO<sub>10</sub>P (818.13)
- 1571.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-dihydroxypropylethylammonium  
(n = 2)  
C<sub>46</sub>H<sub>88</sub>NO<sub>10</sub>P (846.18)
- 1572.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-dihydroxypropylethylammonium  
(n = 2)  
C<sub>48</sub>H<sub>92</sub>NO<sub>10</sub>P (874.23)
- 1573.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-dihydroxypropylethylammonium  
(n = 2)  
C<sub>50</sub>H<sub>96</sub>NO<sub>10</sub>P (902.29)

- 1574.) 1,2-di-(Z)-10-heneicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{52}H_{100}NO_{10}P$  (930.34)
- 1575.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{54}H_{104}NO_{10}P$  (958.39)
- 1576.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{54}H_{104}NO_{10}P$  (958.39)
- 1577.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{56}H_{108}NO_{10}P$  (986.45)
- 1578.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{58}H_{112}NO_{10}P$  (1014.50)
- 1579.) 1,2-di-(Z)-15-pentacosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{60}H_{116}NO_{10}P$  (1042.56)
- 1580.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{62}H_{120}NO_{10}P$  (1070.61)
- 1581.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{42}H_{76}NO_{10}P$  (786.04)
- 1582.) 1,2-di-(Z,Z)-5,11-heptadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{44}H_{80}NO_{10}P$  (814.09)

- 1583.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{46}H_{84}NO_{10}P$  (842.15)
- 1584.) 1,2-di-(Z,Z)-6,12-nonadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{48}H_{88}NO_{10}P$  (870.20)
- 1585.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{50}H_{92}NO_{10}P$  (898.25)
- 1586.) 1,2-di-(Z,Z)-10,16-heneicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{52}H_{96}NO_{10}P$  (926.31)
- 1587.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{54}H_{100}NO_{10}P$  (955.36)
- 1588.) 1,2-di-(Z,Z)-10,16-tricosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{56}H_{104}NO_{10}P$  (982.42)
- 1589.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{58}H_{108}NO_{10}P$  (1010.47)
- 1590.) 1,2-di-(Z,Z)-10,16-pentacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{60}H_{112}NO_{10}P$  (1038.52)
- 1591.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethyl-ammonium (n = 2)  
 $C_{62}H_{116}NO_{10}P$  (1066.58)

- 1592.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{44}H_{86}NO_{10}P$  (820.14)
- 1593.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{44}H_{90}NO_{10}P$  (848.20)
- 1594.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{48}H_{94}NO_{10}P$  (876.25)
- 1595.) 1-behenyl-2-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{52}H_{102}NO_{10}P$  (932.36)
- 1596.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{44}H_{84}NO_{10}P$  (818.13)
- 1597.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{50}H_{96}NO_{10}P$  (902.29)
- 1598.) 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{52}H_{100}NO_{10}P$  (930.34)
- 1599.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{46}H_{90}NO_{10}P$  (848.20)
- 1600.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{54}H_{104}NO_{10}P$  (958.39)

- 1601.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{52}H_{98}NO_{10}P$  (928.32)
- 1602.) 2-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylethylammonium (n = 2)  
 $C_{52}H_{98}NO_{10}P$  (928.32)

n = 3

- 1603.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{43}H_{82}NO_{10}P$  (804.10)
- 1604.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{45}H_{86}NO_{10}P$  (832.15)
- 1605.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{47}H_{90}NO_{10}P$  (860.21)
- 1606.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{51}H_{98}NO_{10}P$  (916.31)
- 1607.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{55}H_{106}NO_{10}P$  (972.42)
- 1608.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{55}H_{106}NO_{10}P$  (972.42)
- 1609.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{57}H_{110}NO_{10}P$  (1000.47)

- 1610.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropyl-ammonium (n = 3)  
 $C_{59}H_{114}NO_{10}P$  (1028.53)
- 1611.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropyl-ammonium (n = 3)  
 $C_{47}H_{86}NO_{10}P$  (856.17)
- 1612.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropyl-ammonium (n = 3)  
 $C_{51}H_{94}NO_{10}P$  (912.28)
- 1613.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropyl-ammonium (n = 3)  
 $C_{55}H_{102}NO_{10}P$  (968.39)
- 1614.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropyl-ammonium (n = 3)  
 $C_{63}H_{118}NO_{10}P$  (1080.60)
- 1615.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropyl-ammonium (n = 3)  
 $C_{45}H_{88}NO_{10}P$  (834.17)
- 1616.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropyl-ammonium (n = 3)  
 $C_{47}H_{92}NO_{10}P$  (862.22)
- 1617.) 2-(Z)-10-docosenoyl-1-behenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropyl-ammonium (n = 3)  
 $C_{53}H_{104}NO_{10}P$  (946.38)
- 1618.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)  
 $C_{45}H_{86}NO_{10}P$  (832.15)

- 1619.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)

$C_{47}H_{92}NO_{10}P$  (862.22)

- 1620.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylpropylammonium (n = 3)

$C_{55}H_{106}NO_{10}P$  (972.42)

n = 4

- 1621.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)

$C_{48}H_{92}NO_{10}P$  (874.23)

- 1622.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)

$C_{56}H_{108}NO_{10}P$  (986.45)

- 1623.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)

$C_{44}H_{80}NO_{10}P$  (814.09)

- 1624.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)

$C_{56}H_{104}NO_{10}P$  (982.42)

- 1625.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylbutylammonium (n = 4)

$C_{64}H_{120}NO_{10}P$  (1094.63)

n = 6

- 1626.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-dihydroxypropylhexylammonium (n = 6)

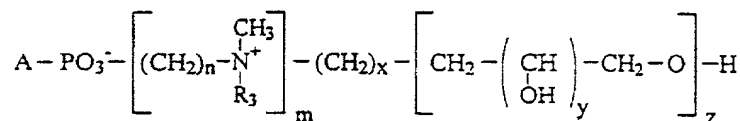
$C_{50}H_{96}NO_{10}P$  (902.29)



- 1627.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-dihydroxypropylhexylammonium  
(n = 6)  
C<sub>58</sub>H<sub>112</sub>NO<sub>10</sub>P (1014.50)
- 1628.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-dihydroxypropylhexyl-  
ammonium (n = 6)  
C<sub>58</sub>H<sub>108</sub>NO<sub>10</sub>P (1010.47)
- 1629.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-dihydroxypropylhexyl-  
ammonium (n = 6)  
C<sub>66</sub>H<sub>124</sub>NO<sub>10</sub>P (1122.69)

2. Examples of two-chain glycerophospho-N,N-  
dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxy-  
propyl)alkylammonium compounds

(A = III; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 0; y = 1; z = 2)



- 1630.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)ethylammonium (n = 2)  
C<sub>45</sub>H<sub>86</sub>NO<sub>12</sub>P (864.15)
- 1631.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>47</sub>H<sub>90</sub>NO<sub>12</sub>P (892.20)
- 1632.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)ethylammonium (n = 2)  
C<sub>49</sub>H<sub>94</sub>NO<sub>12</sub>P (920.26)
- 1633.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)ethylammonium (n = 2)  
C<sub>51</sub>H<sub>98</sub>NO<sub>12</sub>P (948.31)

- 1634.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)ethylammonium (n = 2)  
 $C_{53}H_{102}NO_{12}P$  (976.37)
- 1635.) 1,2-di-(Z)-10-heneicosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{55}H_{106}NO_{12}P$  (1004.42)
- 1636.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)ethylammonium (n = 2)  
 $C_{57}H_{110}NO_{12}P$  (1032.47)
- 1637.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)ethylammonium (n = 2)  
 $C_{57}H_{110}NO_{12}P$  (1032.47)
- 1638.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)ethylammonium (n = 2)  
 $C_{59}H_{114}NO_{12}P$  (1060.53)
- 1639.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{61}H_{118}NO_{12}P$  (1088.58)
- 1640.) 1,2-di-(Z)-15-pentacosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{63}H_{122}NO_{12}P$  (1116.63)
- 1641.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{65}H_{126}NO_{12}P$  (1144.69)
- 1642.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)ethylammonium (n = 2)  
 $C_{45}H_{82}NO_{12}P$  (860.12)

- 1643.) 1,2-di-(Z,Z)-5,11-heptadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>47</sub>H<sub>86</sub>NO<sub>12</sub>P (888.17)
- 1644.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>49</sub>H<sub>90</sub>NO<sub>12</sub>P (916.23)
- 1645.) 1,2-di-(Z,Z)-6,12-nonadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>51</sub>H<sub>94</sub>NO<sub>12</sub>P (944.28)
- 1646.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>53</sub>H<sub>98</sub>NO<sub>12</sub>P (972.33)
- 1647.) 1,2-di-(Z,Z)-10,16-heneicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>55</sub>H<sub>102</sub>NO<sub>12</sub>P (1000.39)
- 1648.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>57</sub>H<sub>106</sub>NO<sub>12</sub>P (1028.44)
- 1649.) 1,2-di-(Z,Z)-10,16-tricosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>59</sub>H<sub>110</sub>NO<sub>12</sub>P (1056.50)
- 1650.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>61</sub>H<sub>114</sub>NO<sub>12</sub>P (1084.55)
- 1651.) 1,2-di-(Z,Z)-10,16-pentacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>63</sub>H<sub>118</sub>NO<sub>12</sub>P (1112.60)

- 1652.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>65</sub>H<sub>122</sub>NO<sub>12</sub>P (1140.66)
- 1653.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>47</sub>H<sub>92</sub>NO<sub>12</sub>P (894.22)
- 1654.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>49</sub>H<sub>96</sub>NO<sub>12</sub>P (922.27)
- 1655.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>51</sub>H<sub>100</sub>NO<sub>12</sub>P (950.33)
- 1656.) 1-behenyl-2-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>55</sub>H<sub>108</sub>NO<sub>12</sub>P (1006.44)
- 1657.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>47</sub>H<sub>90</sub>NO<sub>12</sub>P (892.20)
- 1658.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>53</sub>H<sub>102</sub>NO<sub>12</sub>P (976.37)
- 1659.) 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>55</sub>H<sub>106</sub>NO<sub>12</sub>P (1004.42)

- 1660.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>49</sub>H<sub>96</sub>NO<sub>12</sub>P (922.27)
- 1661.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)ethylammonium (n = 2)  
C<sub>57</sub>H<sub>110</sub>NO<sub>12</sub>P (1032.47)
- 1662.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)-ethylammonium (n = 2)  
C<sub>55</sub>H<sub>104</sub>NO<sub>12</sub>P (1002.40)
- 1663.) 2-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)-ethylammonium (n = 2)  
C<sub>55</sub>H<sub>104</sub>NO<sub>12</sub>P (1002.40)
- n = 3
- 1664.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
C<sub>46</sub>H<sub>88</sub>NO<sub>12</sub>P (878.18)
- 1665.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
C<sub>48</sub>H<sub>92</sub>NO<sub>12</sub>P (906.23)
- 1666.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
C<sub>50</sub>H<sub>96</sub>NO<sub>12</sub>P (934.29)
- 1667.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
C<sub>54</sub>H<sub>104</sub>NO<sub>12</sub>P (990.39)

- 1668.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)propylammonium (n = 3)  
 $C_{58}H_{112}NO_{12}P$  (1046.50)
- 1669.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)propylammonium (n = 3)  
 $C_{58}H_{112}NO_{12}P$  (1046.50)
- 1670.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-  
dihydroxypropyl)propylammonium (n = 3)  
 $C_{60}H_{116}NO_{12}P$  (1074.55)
- 1671.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{62}H_{120}NO_{12}P$  (1102.61)
- 1672.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{50}H_{92}NO_{12}P$  (930.25)
- 1673.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{54}H_{100}NO_{12}P$  (986.36)
- 1674.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{58}H_{108}NO_{12}P$  (1042.47)
- 1675.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{66}H_{124}NO_{12}P$  (1154.68)
- 1676.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-  
O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{48}H_{94}NO_{12}P$  (908.25)

- 1677.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{50}H_{98}NO_{12}P$  (936.30)
- 1678.) 2-(Z)-10-docosenoyl-1-behenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{56}H_{110}NO_{12}P$  (1020.46)
- 1679.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{48}H_{92}NO_{12}P$  (906.23)
- 1680.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{50}H_{98}NO_{12}P$  (936.30)
- 1681.) 2-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)propylammonium (n = 3)  
 $C_{58}H_{112}NO_{12}P$  (1046.50)
- n = 4
- 1682.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
 $C_{51}H_{98}NO_{12}P$  (948.31)
- 1683.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
 $C_{59}H_{114}NO_{12}P$  (1060.53)
- 1684.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
 $C_{47}H_{86}NO_{12}P$  (888.17)

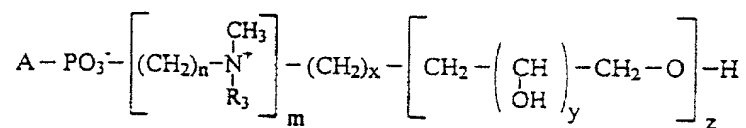
- 1685.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>59</sub>H<sub>110</sub>NO<sub>12</sub>P (1056.50)
- 1686.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)butylammonium (n = 4)  
C<sub>67</sub>H<sub>126</sub>NO<sub>12</sub>P (1168.71)

n = 6

- 1687.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)  
C<sub>53</sub>H<sub>102</sub>NO<sub>12</sub>P (976.37)
- 1688.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)  
C<sub>61</sub>H<sub>118</sub>NO<sub>12</sub>P (1088.58)
- 1689.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)  
C<sub>61</sub>H<sub>114</sub>NO<sub>12</sub>P (1084.55)
- 1690.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-dihydroxypropyl)hexylammonium (n = 6)  
C<sub>69</sub>H<sub>130</sub>NO<sub>12</sub>P (1196.76)

3. Examples of two-chain glycerophospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-2-hydroxypropyl-3,1-O,O-dihydroxypropyl)alkylammonium compounds

(A = III; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 0; y = 1; z = 3)





- 1691.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium  
(n = 2)  
C<sub>48</sub>H<sub>92</sub>NO<sub>14</sub>P (938.23)
- 1692.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-  
diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>50</sub>H<sub>96</sub>NO<sub>14</sub>P (966.28)
- 1693.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium  
(n = 2)  
C<sub>52</sub>H<sub>100</sub>NO<sub>14</sub>P (994.34)
- 1694.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium  
(n = 2)  
C<sub>54</sub>H<sub>104</sub>NO<sub>14</sub>P (1022.39)
- 1695.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium  
(n = 2)  
C<sub>56</sub>H<sub>108</sub>NO<sub>14</sub>P (1050.45)
- 1696.) 1,2-di-(Z)-10-heneicosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-  
ammonium (n = 2)  
C<sub>58</sub>H<sub>112</sub>NO<sub>14</sub>P (1078.50)
- 1697.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium  
(n = 2)  
C<sub>60</sub>H<sub>116</sub>NO<sub>14</sub>P (1106.55)
- 1698.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium  
(n = 2)  
C<sub>60</sub>H<sub>116</sub>NO<sub>14</sub>P (1106.55)
- 1699.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium  
(n = 2)  
C<sub>62</sub>H<sub>120</sub>NO<sub>14</sub>P (1134.61)

- 1700.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>64</sub>H<sub>124</sub>NO<sub>14</sub>P (1134.61)
- 1701.) 1,2-di-(Z)-15-pentacosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>66</sub>H<sub>128</sub>NO<sub>14</sub>P (1190.71)
- 1702.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>68</sub>H<sub>132</sub>NO<sub>14</sub>P (1218.77)
- 1703.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>48</sub>H<sub>88</sub>NO<sub>14</sub>P (934.20)
- 1704.) 1,2-di-(Z,Z)-5,11-heptadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>50</sub>H<sub>92</sub>NO<sub>14</sub>P (962.25)
- 1705.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>52</sub>H<sub>96</sub>NO<sub>14</sub>P (990.31)
- 1706.) 1,2-di-(Z,Z)-6,12-nonadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>54</sub>H<sub>100</sub>NO<sub>14</sub>P (1018.36)
- 1707.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>56</sub>H<sub>104</sub>NO<sub>14</sub>P (1046.41)
- 1708.) 1,2-di-(Z,Z)-10,16-heneicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>58</sub>H<sub>108</sub>NO<sub>14</sub>P (1074.47)

- 1709.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>60</sub>H<sub>112</sub>NO<sub>14</sub>P (1102.52)
- 1710.) 1,2-di-(Z,Z)-10,16-tricosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>62</sub>H<sub>116</sub>NO<sub>14</sub>P (1130.58)
- 1711.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>64</sub>H<sub>120</sub>NO<sub>14</sub>P (1158.63)
- 1712.) 1,2-di-(Z,Z)-10,16-pentacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>66</sub>H<sub>124</sub>NO<sub>14</sub>P (1186.68)
- 1713.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>68</sub>H<sub>128</sub>NO<sub>14</sub>P (1214.74)
- 1714.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>50</sub>H<sub>98</sub>NO<sub>14</sub>P (968.30)
- 1715.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>52</sub>H<sub>102</sub>NO<sub>14</sub>P (996.35)
- 1716.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>54</sub>H<sub>106</sub>NO<sub>14</sub>P (1024.41)
- 1717.) 1-behenyl-2-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethyl-ammonium (n = 2)  
C<sub>58</sub>H<sub>114</sub>NO<sub>14</sub>P (1080.52)

- 1718.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>50</sub>H<sub>96</sub>NO<sub>14</sub>P (966.28)
- 1719.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>56</sub>H<sub>108</sub>NO<sub>14</sub>P (1050.45)
- 1720.) 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>58</sub>H<sub>112</sub>NO<sub>14</sub>P (1078.50)
- 1721.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>52</sub>H<sub>102</sub>NO<sub>14</sub>P (996.35)
- 1722.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>60</sub>H<sub>116</sub>NO<sub>14</sub>P (1106.55)
- 1723.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>58</sub>H<sub>110</sub>NO<sub>14</sub>P (1076.48)
- 1724.) 2-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)ethylammonium (n = 2)  
C<sub>58</sub>H<sub>110</sub>NO<sub>14</sub>P (1076.48)
- n = 3
- 1725.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)  
C<sub>49</sub>H<sub>94</sub>NO<sub>14</sub>P (952.26)
- 1726.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)

- $C_{51}H_{98}NO_{14}P$  (980.31)  
1727.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium  
(n = 3)  
 $C_{53}H_{102}NO_{14}P$  (1008.36)  
1728.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium  
(n = 3)  
 $C_{57}H_{110}NO_{14}P$  (1064.47)  
1729.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium  
(n = 3)  
 $C_{61}H_{118}NO_{14}P$  (1120.58)  
1730.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium  
(n = 3)  
 $C_{61}H_{118}NO_{14}P$  (1120.58)  
1731.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium  
(n = 3)  
 $C_{63}H_{122}NO_{14}P$  (1148.63)  
1732.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propyl-  
ammonium (n = 3)  
 $C_{65}H_{126}NO_{14}P$  (1176.69)  
1733.) 1,2-di(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propyl-  
ammonium (n = 3)  
 $C_{53}H_{98}NO_{14}P$  (1004.33)  
1734.) 1,2-di(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propyl-  
ammonium (n = 3)  
 $C_{57}H_{106}NO_{14}P$  (1060.44)  
1735.) 1,2-di(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propyl-  
ammonium (n = 3)  
 $C_{61}H_{114}NO_{14}P$  (1116.55)

- 1736.) 1,2-di(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propyl-ammonium (n = 3)

C<sub>69</sub>H<sub>130</sub>NO<sub>14</sub>P (1228.76)

- 1737.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propyl-ammonium (n = 3)

C<sub>51</sub>H<sub>100</sub>NO<sub>14</sub>P (982.33)

- 1738.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propyl-ammonium (n = 3)

C<sub>53</sub>H<sub>104</sub>NO<sub>14</sub>P (1010.38)

- 1739.) 2-(Z)-10-docosenoyl-1-behenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propyl-ammonium (n = 3)

C<sub>59</sub>H<sub>116</sub>NO<sub>14</sub>P (1094.54)

- 1740.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)

C<sub>51</sub>H<sub>98</sub>NO<sub>14</sub>P (980.31)

- 1741.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propyl-ammonium (n = 3)

C<sub>53</sub>H<sub>104</sub>NO<sub>14</sub>P (1010.38)

- 1742.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)propylammonium (n = 3)

C<sub>61</sub>H<sub>118</sub>NO<sub>14</sub>P (1120.58)

n = 4

- 1743.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)

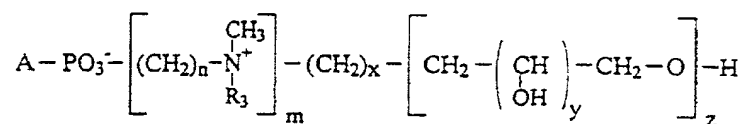
C<sub>54</sub>H<sub>104</sub>NO<sub>14</sub>P (1022.39)

- 1744.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)

- $C_{62}H_{120}NO_{14}P$  (1134.61)
- 1745.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)
- $C_{50}H_{92}NO_{14}P$  (962.25)
- 1746.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)
- $C_{62}H_{116}NO_{14}P$  (1130.58)
- 1747.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)butylammonium (n = 4)
- $C_{70}H_{132}NO_{14}P$  (1242.79)
- n = 6
- 1748.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)
- $C_{56}H_{108}NO_{14}P$  (1050.45)
- 1749.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)
- $C_{64}H_{124}NO_{14}P$  (1162.66)
- 1750.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)
- $C_{64}H_{120}NO_{14}P$  (1158.63)
- 1751.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-diHP<sub>3</sub>)hexylammonium (n = 6)
- $C_{72}H_{136}NO_{14}P$  (1270.84)

4. Examples of two-chain glycerophospho-N,N-dimethyl-N-(2-hydroxypropyl-3,1-O,O-2-hydroxypropyl-3,1-O,O-2-hydroxypropyl-3,1-O,O-dihydroxypropyl)alkylammonium compounds

(A = III; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 0; y = 1; z = 4)



In the following text, N-(2-hydroxypropyl-3,1-O,O-2-hydroxypropyl-3,1-O,O-2-hydroxypropyl-3,1-O,O-dihydroxypropyl) is abbreviated to N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>).

1752.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)

C<sub>51</sub>H<sub>98</sub>NO<sub>16</sub>P (1012.31)

1753.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)

C<sub>53</sub>H<sub>102</sub>NO<sub>16</sub>P (1040.36)

1754.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)

C<sub>55</sub>H<sub>106</sub>NO<sub>16</sub>P (1068.42)

1755.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)

C<sub>57</sub>H<sub>110</sub>NO<sub>16</sub>P (1096.47)

1756.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)

C<sub>59</sub>H<sub>114</sub>NO<sub>16</sub>P (1124.53)

1757.) 1,2-di-(Z)-10-heneicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)

C<sub>61</sub>H<sub>118</sub>NO<sub>16</sub>P (1152.58)



- 1758.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium  
(n = 2)  
C<sub>63</sub>H<sub>122</sub>NO<sub>16</sub>P (1180.63)
- 1759.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium  
(n = 2)  
C<sub>63</sub>H<sub>122</sub>NO<sub>16</sub>P (1180.63)
- 1760.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-  
N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium  
(n = 2)  
C<sub>65</sub>H<sub>126</sub>NO<sub>16</sub>P (1208.69)
- 1761.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethyl-  
ammonium (n = 2)  
C<sub>67</sub>H<sub>130</sub>NO<sub>16</sub>P (1236.74)
- 1762.) 1,2-di-(Z)-15-pentacosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethyl-  
ammonium (n = 2)  
C<sub>69</sub>H<sub>134</sub>NO<sub>16</sub>P (1264.79)
- 1763.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethyl-  
ammonium (n = 2)  
C<sub>71</sub>H<sub>138</sub>NO<sub>16</sub>P (1292.85)
- 1764.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethyl-  
ammonium (n = 2)  
C<sub>51</sub>H<sub>94</sub>NO<sub>16</sub>P (1008.28)
- 1765.) 1,2-di-(Z,Z)-5,11-heptadecadienoyl-*sn*-glycero-  
3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-  
diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>53</sub>H<sub>98</sub>NO<sub>16</sub>P (1036.33)
- 1766.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-  
phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethyl-  
ammonium (n = 2)  
C<sub>55</sub>H<sub>102</sub>NO<sub>16</sub>P (1064.39)

- 1767.) 1,2-di-(Z,Z)-6,12-nonadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>57</sub>H<sub>106</sub>NO<sub>16</sub>P (1092.44)
- 1768.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>59</sub>H<sub>110</sub>NO<sub>16</sub>P (1120.49)
- 1769.) 1,2-di-(Z,Z)-10,16-heneicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>61</sub>H<sub>114</sub>NO<sub>16</sub>P (1148.55)
- 1770.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>63</sub>H<sub>118</sub>NO<sub>16</sub>P (1176.60)
- 1771.) 1,2-di-(Z,Z)-10,16-tricosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>65</sub>H<sub>122</sub>NO<sub>16</sub>P (1204.65)
- 1772.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>67</sub>H<sub>126</sub>NO<sub>16</sub>P (1232.71)
- 1773.) 1,2-di-(Z,Z)-10,6-pentacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>69</sub>H<sub>130</sub>NO<sub>16</sub>P (1260.76)
- 1774.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>71</sub>H<sub>134</sub>NO<sub>16</sub>P (1288.82)
- 1775.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>53</sub>H<sub>104</sub>NO<sub>16</sub>P (1042.38)

- 1776.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>55</sub>H<sub>108</sub>NO<sub>16</sub>P (1070.43)
- 1777.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>57</sub>H<sub>112</sub>NO<sub>16</sub>P (1098.49)
- 1778.) 1-behenyl-2-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>61</sub>H<sub>120</sub>NO<sub>16</sub>P (1154.59)
- 1779.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>53</sub>H<sub>102</sub>NO<sub>16</sub>P (1040.36)
- 1780.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>59</sub>H<sub>114</sub>NO<sub>16</sub>P (1124.53)
- 1781.) 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>61</sub>H<sub>118</sub>NO<sub>16</sub>P (1152.58)
- 1782.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>55</sub>H<sub>108</sub>NO<sub>16</sub>P (1070.43)
- 1783.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>63</sub>H<sub>122</sub>NO<sub>16</sub>P (1180.63)
- 1784.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>61</sub>H<sub>116</sub>NO<sub>16</sub>P (1150.56)

- 1785.) 2-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)ethylammonium (n = 2)  
C<sub>61</sub>H<sub>116</sub>NO<sub>16</sub>P (1150.56)

n = 3

- 1786.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)propylammonium (n = 3)  
C<sub>52</sub>H<sub>100</sub>NO<sub>16</sub>P (1026.34)
- 1787.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)propylammonium (n = 3)  
C<sub>54</sub>H<sub>104</sub>NO<sub>16</sub>P (1054.39)
- 1788.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)propylammonium (n = 3)  
C<sub>56</sub>H<sub>108</sub>NO<sub>16</sub>P (1082.44)
- 1789.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)propylammonium (n = 3)  
C<sub>60</sub>H<sub>116</sub>NO<sub>16</sub>P (1138.55)
- 1790.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)propylammonium (n = 3)  
C<sub>64</sub>H<sub>124</sub>NO<sub>16</sub>P (1194.66)
- 1791.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)propylammonium (n = 3)  
C<sub>64</sub>H<sub>124</sub>NO<sub>16</sub>P (1194.66)
- 1792.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)propylammonium (n = 3)  
C<sub>66</sub>H<sub>128</sub>NO<sub>16</sub>P (1222.71)
- 1793.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)propylammonium (n = 3)  
C<sub>68</sub>H<sub>132</sub>NO<sub>16</sub>P (1250.77)

- 1794.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)-propylammonium (n = 3)  
C<sub>56</sub>H<sub>104</sub>NO<sub>16</sub>P (1078.41)
- 1795.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)-propylammonium (n = 3)  
C<sub>60</sub>H<sub>112</sub>NO<sub>16</sub>P (1134.52)
- 1796.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)-propylammonium (n = 3)  
C<sub>64</sub>H<sub>120</sub>NO<sub>16</sub>P (1190.63)
- 1797.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)-propylammonium (n = 3)  
C<sub>72</sub>H<sub>136</sub>NO<sub>16</sub>P (1302.84)
- 1798.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)-propylammonium (n = 3)  
C<sub>54</sub>H<sub>106</sub>NO<sub>16</sub>P (1056.41)
- 1799.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)-propylammonium (n = 3)  
C<sub>56</sub>H<sub>110</sub>NO<sub>16</sub>P (1084.46)
- 1800.) 2-(Z)-10-docosenoyl-1-behenyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)-propylammonium (n = 3)  
C<sub>62</sub>H<sub>122</sub>NO<sub>16</sub>P (1168.62)
- 1801.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)-propylammonium (n = 3)  
C<sub>54</sub>H<sub>104</sub>NO<sub>16</sub>P (1054.39)
- 1802.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)-propylammonium (n = 3)  
C<sub>56</sub>H<sub>110</sub>NO<sub>16</sub>P (1084.46)

- 1803.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)propylammonium (n = 3)  
C<sub>64</sub>H<sub>124</sub>NO<sub>16</sub>P (1194.66)

n = 4

- 1804.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)butylammonium (n = 4)  
C<sub>57</sub>H<sub>110</sub>NO<sub>16</sub>P (1096.47)

- 1805.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)butylammonium (n = 4)  
C<sub>65</sub>H<sub>126</sub>NO<sub>16</sub>P (1208.69)

- 1806.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)butylammonium (n = 4)  
C<sub>53</sub>H<sub>98</sub>NO<sub>16</sub>P (1036.33)

- 1807.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)butylammonium (n = 4)  
C<sub>65</sub>H<sub>122</sub>NO<sub>16</sub>P (1204.65)

- 1808.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)butylammonium (n = 4)  
C<sub>73</sub>H<sub>138</sub>NO<sub>16</sub>P (1316.87)

n = 6

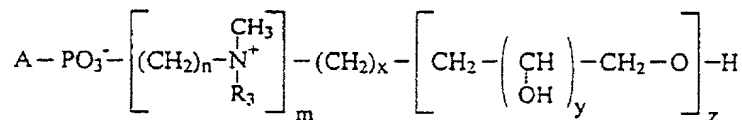
- 1809.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)hexylammonium (n = 6)  
C<sub>59</sub>H<sub>114</sub>NO<sub>16</sub>P (1124.53)

- 1810.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)hexylammonium (n = 6)  
C<sub>67</sub>H<sub>130</sub>NO<sub>16</sub>P (1236.74)

- 1811.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)hexylammonium (n = 6)  
C<sub>67</sub>H<sub>126</sub>NO<sub>16</sub>P (1232.71)
- 1812.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N-dimethyl-N-(HP<sub>1</sub>-HP<sub>2</sub>-HP<sub>3</sub>-diHP<sub>4</sub>)hexylammonium (n = 6)  
C<sub>75</sub>H<sub>142</sub>NO<sub>16</sub>P (1344.92)

5. Examples of two-chain glycerophospho compounds not hydroxylated on the nitrogen

(A = III; n = 2-6; R<sub>3</sub>, CH<sub>3</sub>; m = 1, x = 1; z = 0)



- 1813.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>41</sub>H<sub>78</sub>NO<sub>8</sub>P (744.05)
- 1814.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>43</sub>H<sub>82</sub>NO<sub>8</sub>P (772.10)
- 1815.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>45</sub>H<sub>86</sub>NO<sub>8</sub>P (800.15)
- 1816.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>49</sub>H<sub>94</sub>NO<sub>8</sub>P (856.26)
- 1817.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>53</sub>H<sub>102</sub>NO<sub>8</sub>P (912.37)
- 1818.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>53</sub>H<sub>102</sub>NO<sub>8</sub>P (912.37)
- 1819.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
C<sub>55</sub>H<sub>106</sub>NO<sub>8</sub>P (940.42)

- 1820.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{57}H_{110}NO_8P$  (968.48)
- 1821.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{45}H_{82}NO_8P$  (796.12)
- 1822.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{49}H_{90}NO_8P$  (852.23)
- 1823.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{53}H_{98}NO_8P$  (908.34)
- 1824.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{61}H_{114}NO_8P$  (1020.55)
- 1825.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{43}H_{84}NO_8P$  (774.12)
- 1826.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{45}H_{88}NO_8P$  (802.17)
- 1827.) 2-(Z)-10-docosenoyl-1-behenyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{51}H_{100}NO_8P$  (886.33)
- 1828.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{43}H_{82}NO_8P$  (772.10)
- 1829.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{45}H_{88}NO_8P$  (802.17)
- 1830.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-N,N,N-trimethylpropylammonium (n = 3)  
 $C_{53}H_{102}NO_8P$  (912.37)



n = 4

- 1831.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-  
N,N,N-trimethylbutylammonium (n = 4)  
C<sub>46</sub>H<sub>88</sub>NO<sub>8</sub>P (814.18)
- 1832.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
N,N,N-trimethylbutylammonium (n = 4)  
C<sub>54</sub>H<sub>104</sub>NO<sub>8</sub>P (926.40)
- 1833.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-  
phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>42</sub>H<sub>76</sub>NO<sub>8</sub>P (796.12)
- 1834.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-  
phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>54</sub>H<sub>100</sub>NO<sub>8</sub>P (922.36)
- 1835.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-  
phospho-N,N,N-trimethylbutylammonium (n = 4)  
C<sub>62</sub>H<sub>116</sub>NO<sub>8</sub>P (1034.58)

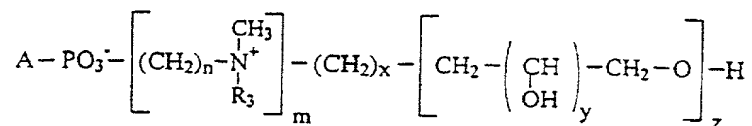
n = 6

- 1836.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-  
N,N,N-trimethylhexylammonium (n = 6)  
C<sub>48</sub>H<sub>92</sub>NO<sub>8</sub>P (842.23)
- 1837.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
N,N,N-trimethylhexylammonium (n = 6)  
C<sub>56</sub>H<sub>108</sub>NO<sub>8</sub>P (954.45)
- 1838.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-  
phospho-N,N,N-trimethylhexylammonium (n = 6)  
C<sub>56</sub>H<sub>104</sub>NO<sub>8</sub>P (950.42)
- 1839.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-  
phospho-N,N,N-trimethylhexylammonium (n = 6)  
C<sub>64</sub>H<sub>120</sub>NO<sub>8</sub>P (1062.63)

Negatively charged phospholipids: **Phosphatidyloligo-  
glycerols**

6. Examples of glycerol-glycerols (Na salts of phospho-G<sub>1</sub>-G<sub>2</sub> compounds)

(A = III; m = 0; y = 1; z = 2)



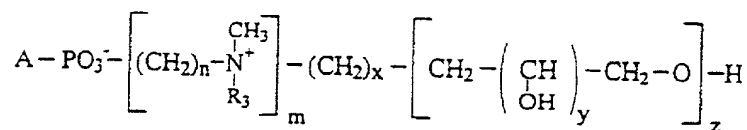
- 1840.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt  
C<sub>41</sub>H<sub>76</sub>NaO<sub>12</sub>P (815.01)
- 1841.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt  
C<sub>43</sub>H<sub>80</sub>NaO<sub>12</sub>P (843.06)
- 1842.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt  
C<sub>45</sub>H<sub>84</sub>NaO<sub>12</sub>P (871.12)
- 1843.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt  
C<sub>47</sub>H<sub>88</sub>NaO<sub>12</sub>P (899.17)
- 1844.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt  
C<sub>49</sub>H<sub>92</sub>NaO<sub>12</sub>P (927.23)
- 1845.) 1,2-di-(Z)-10-heneicosenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt  
C<sub>51</sub>H<sub>96</sub>NaO<sub>12</sub>P (955.28)
- 1846.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt  
C<sub>53</sub>H<sub>100</sub>NaO<sub>12</sub>P (983.33)
- 1847.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt  
C<sub>53</sub>H<sub>100</sub>NaO<sub>12</sub>P (983.33)
- 1848.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt  
C<sub>55</sub>H<sub>104</sub>NaO<sub>12</sub>P (1011.39)
- 1849.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-glycerol-glycerol; Na salt

- $C_{57}H_{108}NaO_{12}P$  (1039.44)
- 1850.) 1,2-di-(Z)-15-pentacosenoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{59}H_{112}NaO_{12}P$  (1067.49)
- 1851.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{61}H_{116}NaO_{12}P$  (1095.55)
- 1852.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{41}H_{72}NaO_{12}P$  (810.98)
- 1853.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{45}H_{80}NaO_{12}P$  (867.09)
- 1854.) 1,2-di-(Z,Z)-6,12-nonadecadienoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{47}H_{84}NaO_{12}P$  (895.14)
- 1855.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{49}H_{88}NaO_{12}P$  (923.19)
- 1856.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{53}H_{96}NaO_{12}P$  (979.30)
- 1857.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{57}H_{104}NaO_{12}P$  (1035.41)
- 1858.) 1,2-di-(Z,Z)-10,16-pentacosadienoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{59}H_{108}NaO_{12}P$  (1063.46)
- 1859.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{61}H_{112}NaO_{12}P$  (1091.52)
- 1860.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt
- $C_{43}H_{82}NaO_{12}P$  (845.08)
- 1861.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt

- $C_{45}H_{86}NaO_{12}P$  (873.13)  
 1862.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt  
 $C_{47}H_{90}NaO_{12}P$  (901.19)  
 1863.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt  
 $C_{43}H_{80}NaO_{12}P$  (843.06)  
 1864.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt  
 $C_{49}H_{92}NaO_{12}P$  (927.23)  
 1865.) 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt  
 $C_{51}H_{96}NaO_{12}P$  (955.28)  
 1866.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt  
 $C_{45}H_{86}NaO_{12}P$  (873.13)  
 1867.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt  
 $C_{53}H_{100}NaO_{12}P$  (983.33)  
 1868.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt  
 $C_{51}H_{94}NaO_{12}P$  (953.26)  
 1869.) 2-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-glycero-glycerol; Na salt  
 $C_{51}H_{94}NaO_{12}P$  (953.26)

**7. Examples of phosphatidyl-glycero-glycerols**  
**(Na salts of phospho- $G_1$ - $G_2$ - $G_3$  compounds)**

(A = III; m = 0, x = 0; y = 1; z = 3)



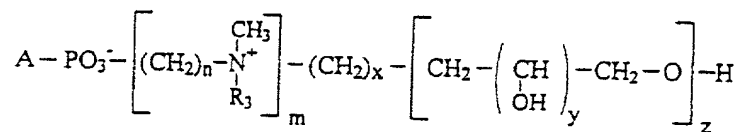
- 1870.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-  
glycero-glycero-glycerol; Na salt  
 $C_{44}H_{82}NaO_{14}P$  (889.09)
- 1871.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-  
phospho-glycero-glycero-glycerol; Na salt  
 $C_{46}H_{86}NaO_{14}P$  (917.14)
- 1872.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-  
glycero-glycero-glycerol; Na salt  
 $C_{48}H_{90}NaO_{14}P$  (945.20)
- 1873.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-  
glycero-glycero-glycerol; Na salt  
 $C_{50}H_{94}NaO_{14}P$  (973.25)
- 1874.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-  
glycero-glycero-glycerol; Na salt  
 $C_{52}H_{98}NaO_{14}P$  (1001.31)
- 1875.) 1,2-di-(Z)-10-heneicosenoyl-*sn*-glycero-3-  
phospho-glycero-glycero-glycerol; Na salt  
 $C_{54}H_{102}NaO_{14}P$  (1029.36)
- 1876.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
glycero-glycero-glycerol; Na salt  
 $C_{56}H_{106}NaO_{14}P$  (1057.41)
- 1877.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-  
glycero-glycero-glycerol; Na salt  
 $C_{56}H_{106}NaO_{14}P$  (1057.41)
- 1878.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-  
glycero-glycero-glycerol; Na salt  
 $C_{58}H_{110}NaO_{14}P$  (1085.47)
- 1879.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-  
phospho-glycero-glycero-glycerol; Na salt  
 $C_{60}H_{114}NaO_{14}P$  (1113.52)
- 1880.) 1,2-di-(Z)-15-pentacosenoyl-*sn*-glycero-3-  
phospho-glycero-glycero-glycerol; Na salt  
 $C_{62}H_{118}NaO_{14}P$  (1141.57)
- 1881.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-  
phospho-glycero-glycero-glycerol; Na salt  
 $C_{64}H_{122}NaO_{14}P$  (1169.63)

- 1882.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{44}H_{78}NaO_{14}P$  (885.06)
- 1883.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{48}H_{86}NaO_{14}P$  (941.17)
- 1884.) 1,2-di-(Z,Z)-6,12-nonadecadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{50}H_{90}NaO_{14}P$  (969.22)
- 1885.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{52}H_{94}NaO_{14}P$  (997.27)
- 1886.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{56}H_{102}NaO_{14}P$  (1053.38)
- 1887.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{60}H_{110}NaO_{14}P$  (1109.49)
- 1888.) 1,2-di-(Z,Z)-10,16-pentacosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{62}H_{114}NaO_{14}P$  (1137.54)
- 1889.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{64}H_{118}NaO_{14}P$  (1165.60)
- 1890.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{46}H_{88}NaO_{14}P$  (919.16)
- 1891.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{48}H_{92}NaO_{14}P$  (947.21)
- 1892.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{50}H_{96}NaO_{14}P$  (975.27)
- 1893.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{46}H_{86}NaO_{14}P$  (917.14)

- 1894.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{52}H_{98}NaO_{14}P$  (1001.31)
- 1895.) 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{54}H_{102}NaO_{14}P$  (1029.36)
- 1896.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{48}H_{92}NaO_{14}P$  (947.21)
- 1897.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{56}H_{106}NaO_{14}P$  (1057.41)
- 1898.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{54}H_{100}NaO_{14}P$  (1027.34)
- 1899.) 2-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{54}H_{100}NaO_{14}P$  (1027.34)

8. Examples of phosphatidyl-glycero-glycero-glycero-glycerols (Na salts of phospho- $G_1$ - $G_2$ - $G_3$ - $G_4$  compounds)

(A = III; m = 0, x = 0; y = 1; z = 4)



- 1900.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycero-glycerol; Na salt  
 $C_{47}H_{88}NaO_{16}P$  (963.17)

- 1901.) 1,2-di-(Z)-10-heptadecenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{49}H_{92}NaO_{16}P$  (991.22)
- 1902.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{51}H_{96}NaO_{16}P$  (1019.28)
- 1903.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{53}H_{100}NaO_{16}P$  (1047.33)
- 1904.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{55}H_{104}NaO_{16}P$  (1075.38)
- 1905.) 1,2-di-(Z)-10-heneicosenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{57}H_{108}NaO_{16}P$  (1103.44)
- 1906.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{59}H_{112}NaO_{16}P$  (1131.49)
- 1907.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{59}H_{112}NaO_{16}P$  (1131.49)
- 1908.) 1,2-di-(Z)-10-tricosenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{61}H_{116}NaO_{16}P$  (1159.55)
- 1909.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{63}H_{120}NaO_{16}P$  (1187.60)
- 1910.) 1,2-di-(Z)-15-pentacosenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{65}H_{124}NaO_{16}P$  (1215.65)
- 1911.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{67}H_{128}NaO_{16}P$  (1243.71)



- 1912.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{47}H_{84}NaO_{16}P$  (959.14)
- 1913.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{51}H_{92}NaO_{16}P$  (1015.25)
- 1914.) 1,2-di-(Z,Z)-6,12-nonadecadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{53}H_{96}NaO_{16}P$  (1043.30)
- 1915.) 1,2-di-(Z,Z)-10,16-eicosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{55}H_{100}NaO_{16}P$  (1071.35)
- 1916.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{59}H_{108}NaO_{16}P$  (1127.46)
- 1917.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{63}H_{116}NaO_{16}P$  (1183.57)
- 1918.) 1,2-di-(Z,Z)-10,16-pentacosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{65}H_{120}NaO_{16}P$  (1211.62)
- 1919.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{67}H_{124}NaO_{16}P$  (1239.68)
- 1920.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{49}H_{94}NaO_{16}P$  (993.24)

- 1921.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{51}H_{98}NaO_{16}P$  (1021.29)
- 1922.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{53}H_{102}NaO_{16}P$  (1049.35)
- 1923.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{49}H_{92}NaO_{16}P$  (991.22)
- 1924.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{55}H_{104}NaO_{16}P$  (1075.38)
- 1925.) 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{57}H_{108}NaO_{16}P$  (1103.44)
- 1926.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol;  
Na salt  
 $C_{51}H_{98}NaO_{16}P$  (1021.29)
- 1927.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{59}H_{112}NaO_{16}P$  (1131.49)
- 1928.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{57}H_{106}NaO_{16}P$  (1101.42)
- 1929.) 1-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-glycero-glycero-glycerol; Na salt  
 $C_{57}H_{106}NaO_{16}P$  (1101.42)

9. Examples of phospho-sn-G<sub>1</sub> linkages*sn*-1-G<sub>1</sub>-G<sub>2</sub> compounds

- 1930.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>45</sub>H<sub>84</sub>NaO<sub>12</sub>P (871.12)
- 1931.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>47</sub>H<sub>88</sub>NaO<sub>12</sub>P (899.17)
- 1932.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>53</sub>H<sub>100</sub>NaO<sub>12</sub>P (983.33)
- 1933.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>53</sub>H<sub>100</sub>NaO<sub>12</sub>P (983.33)
- 1934.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>57</sub>H<sub>108</sub>NaO<sub>12</sub>P (1039.44)
- 1935.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>61</sub>H<sub>116</sub>NaO<sub>12</sub>P (1095.55)
- 1936.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>45</sub>H<sub>80</sub>NaO<sub>12</sub>P (867.09)
- 1937.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>53</sub>H<sub>96</sub>NaO<sub>12</sub>P (979.30)
- 1938.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>57</sub>H<sub>104</sub>NaO<sub>12</sub>P (1035.41)
- 1939.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
C<sub>61</sub>H<sub>112</sub>NaO<sub>12</sub>P (1091.52)
- 1940.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt

- $C_{45}H_{86}NaO_{12}P$  (873.13)  
1941.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
 $C_{47}H_{90}NaO_{12}P$  (901.19)  
1942.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
 $C_{43}H_{80}NaO_{12}P$  (843.06)  
1943.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
 $C_{49}H_{92}NaO_{12}P$  (927.23)  
1944.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycerol; Na salt  
 $C_{53}H_{100}NaO_{12}P$  (983.33)

***sn*-1-G<sub>1</sub>-G<sub>2</sub>-G<sub>3</sub> compounds**

- 1945.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{48}H_{90}NaO_{14}P$  (945.20)  
1946.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{50}H_{94}NaO_{14}P$  (973.25)  
1947.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{56}H_{106}NaO_{14}P$  (1057.41)  
1948.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{56}H_{106}NaO_{14}P$  (1057.41)  
1949.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{60}H_{114}NaO_{14}P$  (1113.52)  
1950.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{64}H_{122}NaO_{14}P$  (1169.63)

- 1951.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{48}H_{86}NaO_{14}P$  (941.17)
- 1952.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{56}H_{102}NaO_{14}P$  (1053.38)
- 1953.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol;  
Na salt  
 $C_{60}H_{110}NaO_{14}P$  (1109.49)
- 1954.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{64}H_{118}NaO_{14}P$  (1165.60)
- 1955.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{48}H_{92}NaO_{14}P$  (947.21)
- 1956.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{50}H_{96}NaO_{14}P$  (975.27)
- 1957.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{46}H_{86}NaO_{14}P$  (917.14)
- 1958.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{52}H_{98}NaO_{14}P$  (1001.31)
- 1959.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycerol; Na salt  
 $C_{56}H_{106}NaO_{14}P$  (1057.41)

***sn*-1-G<sub>1</sub>-G<sub>2</sub>-G<sub>3</sub>-G<sub>4</sub> compounds**

- 1960.) 1,2-di-(Z)-6-octadecenoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycero-glycerol; Na salt  
 $C_{51}H_{96}NaO_{16}P$  (1019.28)

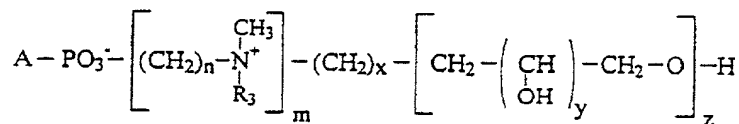
- 1961.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-  
*sn*-1-glycero-glycero-glycero-glycerol; Na salt  
 $C_{53}H_{100}NaO_{16}P$  (1047.33)
- 1962.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-  
*sn*-1-glycero-glycero-glycero-glycerol; Na salt  
 $C_{59}H_{112}NaO_{16}P$  (1131.49)
- 1963.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-  
*sn*-1-glycero-glycero-glycero-glycerol; Na salt  
 $C_{59}H_{112}NaO_{16}P$  (1131.49)
- 1964.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-  
phospho-*sn*-1-glycero-glycero-glycero-glycerol;  
Na salt  
 $C_{63}H_{120}NaO_{16}P$  (1187.60)
- 1965.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-  
phospho-*sn*-1-glycero-glycero-glycero-glycerol;  
Na salt  
 $C_{67}H_{128}NaO_{16}P$  (1243.71)
- 1966.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-  
phospho-*sn*-1-glycero-glycero-glycero-glycerol;  
Na salt  
 $C_{51}H_{92}NaO_{16}P$  (1015.25)
- 1967.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-  
phospho-*sn*-1-glycero-glycero-glycero-glycerol;  
Na salt  
 $C_{59}H_{108}NaO_{16}P$  (1127.46)
- 1968.) 1,2-di-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-  
3-phospho-*sn*-1-glycero-glycero-glycero-  
glycerol; Na salt  
 $C_{63}H_{116}NaO_{16}P$  (1183.57)
- 1969.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-  
phospho-*sn*-1-glycero-glycero-glycero-glycerol;  
Na salt  
 $C_{67}H_{124}NaO_{16}P$  (1239.68)
- 1970.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-  
phospho-*sn*-1-glycero-glycero-glycero-glycerol;  
Na salt  
 $C_{51}H_{98}NaO_{16}P$  (1021.29)

- 1971.) 2-(Z)-10-eicosenoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycero-glycerol; Na salt  
 $C_{53}H_{102}NaO_{16}P$  (1049.35)
- 1972.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycero-glycerol; Na salt  
 $C_{49}H_{92}NaO_{16}P$  (991.22)
- 1973.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycero-glycerol; Na salt  
 $C_{55}H_{104}NaO_{16}P$  (1075.38)
- 1974.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-*sn*-1-glycero-glycero-glycero-glycerol; Na salt  
 $C_{59}H_{112}NaO_{16}P$  (1131.49)

#### Linkages with sugar alcohols

#### 10. Phospho-D-mannitol compounds

(A = III; m = 0, x = 0; y = 4; z = 1)



- 1975.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{41}H_{76}NaO_{13}P$  (831.01)
- 1976.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{47}H_{88}NaO_{13}P$  (915.17)
- 1977.) 1,2-di-(Z)-12-eicosenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{49}H_{92}NaO_{13}P$  (943.23)
- 1978.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{53}H_{100}NaO_{13}P$  (999.33)

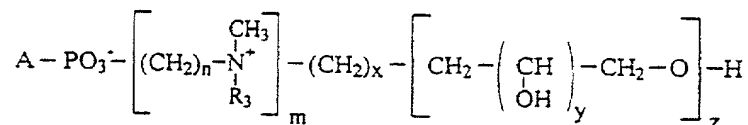
- 1979.) 1,2-di-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{53}H_{100}NaO_{13}P$  (999.33)
- 1980.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{57}H_{108}NaO_{13}P$  (1055.44)
- 1981.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{61}H_{116}NaO_{13}P$  (1111.55)
- 1982.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{41}H_{72}NaO_{13}P$  (826.98)
- 1983.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{45}H_{80}NaO_{13}P$  (883.09)
- 1984.) 1,2-di-(Z,Z)-6,12-nonadecadienoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{47}H_{84}NaO_{13}P$  (911.14)
- 1985.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{53}H_{96}NaO_{13}P$  (995.30)
- 1986.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{61}H_{112}NaO_{13}P$  (1107.52)
- 1987.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{43}H_{82}NaO_{13}P$  (861.08)
- 1988.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{45}H_{86}NaO_{13}P$  (889.13)
- 1989.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{43}H_{80}NaO_{13}P$  (859.06)
- 1990.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{49}H_{92}NaO_{13}P$  (943.23)



- 1991.) 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{51}H_{96}NaO_{13}P$  (971.28)
- 1992.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{45}H_{86}NaO_{13}P$  (889.13)
- 1993.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{53}H_{100}NaO_{13}P$  (999.33)
- 1994.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{51}H_{94}NaO_{13}P$  (969.26)
- 1995.) 2-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{51}H_{94}NaO_{13}P$  (969.26)
- 1996.) 1-(Z)-12-docosenoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{31}H_{60}NaO_{12}P$  (678.77)
- 1997.) 1-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{31}H_{58}NaO_{12}P$  (676.76)
- 1998.) 1-(Z)-12-docosenyl-phospho-D-mannitol; Na salt  
 $C_{28}H_{56}NaO_9P$  (590.71)
- 1999.) 1-(Z,Z)-10,16-docosadienyl-phospho-D-mannitol; Na salt  
 $C_{28}H_{54}NaO_9P$  (588.69)
- 2000.) 1-O-(Z)-10-docosenyl-2-O-methyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{32}H_{64}NaO_{11}P$  (678.82)
- 2001.) 1-O-(Z,Z)-10,16-docosadienyl-2-O-methyl-*sn*-glycero-3-phospho-D-mannitol; Na salt  
 $C_{32}H_{62}NaO_{11}P$  (676.80)

11. Phospho-D-lyxitol compounds

(A = III; m = 0, x = 0; y = 3; z = 1)

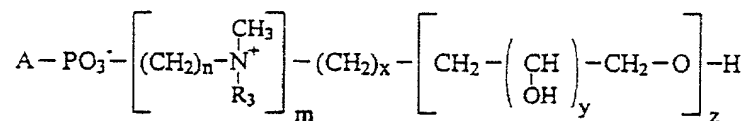


- 2002.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
C<sub>40</sub>H<sub>74</sub>NaO<sub>12</sub>P (800.98)
- 2003.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
C<sub>46</sub>H<sub>86</sub>NaO<sub>12</sub>P (885.15)
- 2004.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
C<sub>52</sub>H<sub>98</sub>NaO<sub>12</sub>P (969.31)
- 2005.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
C<sub>56</sub>H<sub>106</sub>NaO<sub>12</sub>P (1025.41)
- 2006.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
C<sub>60</sub>H<sub>114</sub>NaO<sub>12</sub>P (1081.52)
- 2007.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
C<sub>40</sub>H<sub>70</sub>NaO<sub>12</sub>P (796.95)
- 2008.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
C<sub>44</sub>H<sub>78</sub>NaO<sub>12</sub>P (853.06)
- 2009.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
C<sub>52</sub>H<sub>94</sub>NaO<sub>12</sub>P (965.27)
- 2010.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
C<sub>60</sub>H<sub>110</sub>NaO<sub>12</sub>P (1077.49)

- 2011.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
 $C_{42}H_{80}NaO_{12}P$  (831.05)
- 2012.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
 $C_{44}H_{84}NaO_{12}P$  (859.11)
- 2013.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
 $C_{42}H_{78}NaO_{12}P$  (829.04)
- 2014.) 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
 $C_{48}H_{90}NaO_{12}P$  (913.20)
- 2015.) 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
 $C_{50}H_{94}NaO_{12}P$  (941.25)
- 2016.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
 $C_{44}H_{84}NaO_{12}P$  (859.11)
- 2017.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
 $C_{52}H_{98}NaO_{12}P$  (969.31)
- 2018.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
 $C_{50}H_{92}NaO_{12}P$  (939.24)
- 2019.) 2-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-D-lyxitol; Na salt  
 $C_{50}H_{92}NaO_{12}P$  (939.24)

## 12. Phospho-D-threitol compounds

(A = III; m = 0, x = 0; y = 2; z = 1)



- 2020.) 1,2-di-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{39}H_{72}NaO_{11}P$  (770.96)
- 2021.) 1,2-di-(Z)-6-nonadecenoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{45}H_{84}NaO_{11}P$  (855.12)
- 2022.) 1,2-di-(Z)-10-docosenoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{51}H_{96}NaO_{11}P$  (939.28)
- 2023.) 1,2-di-(Z)-10-tetracosenoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{55}H_{104}NaO_{11}P$  (995.39)
- 2024.) 1,2-di-(Z)-16-hexacosenoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{59}H_{112}NaO_{11}P$  (1051.50)
- 2025.) 1,2-di-(Z,Z)-5,11-hexadecadienoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{39}H_{68}NaO_{11}P$  (766.93)
- 2026.) 1,2-di-(Z,Z)-5,11-octadecadienoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{43}H_{76}NaO_{11}P$  (823.03)
- 2027.) 1,2-di-(Z,Z)-10,16-docosadienoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{51}H_{92}NaO_{11}P$  (935.25)
- 2028.) 1,2-di-(Z,Z)-6,18-hexacosadienoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{59}H_{108}NaO_{11}P$  (1047.46)
- 2029.) 2-(Z)-6-hexadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{41}H_{78}NaO_{11}P$  (801.03)
- 2030.) 2-(Z)-10-octadecenoyl-1-stearoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{43}H_{82}NaO_{11}P$  (829.08)
- 2031.) 2-(Z,Z)-6,12-hexadecadienoyl-1-stearoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{41}H_{76}NaO_{11}P$  (799.01)

- 2032). 2-(Z,Z)-10,16-docosadienoyl-1-stearoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{47}H_{88}NaO_{11}P$  (883.17)
- 2033). 1-stearoyl-2-(Z,Z)-6,18-tetracosadienoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{49}H_{92}NaO_{11}P$  (911.23)
- 2034.) 1-(Z)-10-octadecenoyl-2-stearoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{43}H_{82}NaO_{11}P$  (829.08)
- 2035.) 1-(Z,Z)-6,18-hexacosadienoyl-2-stearoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{51}H_{96}NaO_{11}P$  (939.28)
- 2036.) 1-(Z,Z)-6,18-hexacosadienoyl-2-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{49}H_{90}NaO_{11}P$  (909.21)
- 2037.) 2-(Z,Z)-6,18-hexacosadienoyl-1-(Z)-6-hexadecenoyl-*sn*-glycero-3-phospho-D-threitol; Na salt  
 $C_{49}H_{90}NaO_{11}P$  (909.21)

**Sources:**

[1] Kaufmann-Kolle, P., Berger M.R., Unger, C. and  
H. Eibl

Systemic administration of alkylphosphocholines:  
Erucylphosphocholine and liposomal hexadecylphospho-  
choline

*Adv. Exp. Med. Bio.* 416, 165-168 (1996)

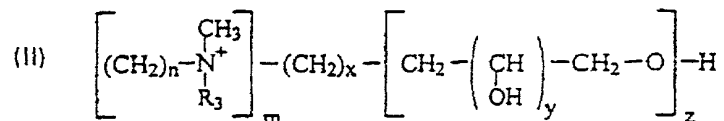
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

## Patent Claims

1. A compound of the general formula (I)



5 in which B is a radical of the general formula (II)



10 in which

n is an integer from 2 to 8;

m is 0, 1 or 2;

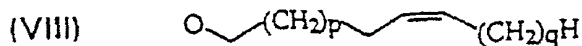
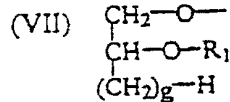
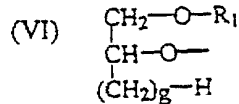
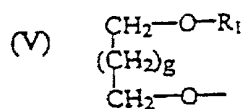
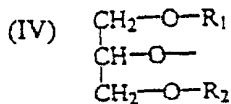
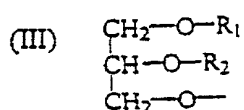
x is an integer from 0 to 8;

y is an integer from 1 to 4;

15 z is an integer from 0 to 5;

R<sub>3</sub> is an alkyl radical having 1 to 3 C atoms, which may be substituted by one or more hydroxyl groups;

20 and in which A is a radical selected from one of the formulae (III) to (IX):



in which

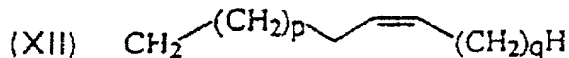
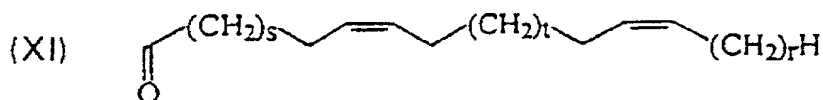
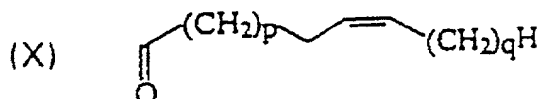
g is an integer from 0 to 8;

25 p, q, r, s, t ≥ 0;

12 ≤ p + q ≤ 30 and

$$8 \leq s + t + r \leq 26;$$

where  $R_1$  and  $R_2$  are each independently hydrogen, a saturated or unsaturated acyl or alkyl radical or a radical selected from one of the formulae (X), (XI), (XII) and (XIII), and at least one of  $R_1$  and  $R_2$  is a radical selected from one of the formulae (X), (XI), (XII) and (XIII):



where  $q \neq 8$  for  $p + q = 14, 16, 18$  or  $20$ , if neither of the radicals  $R_1$  and  $R_2$  is a radical of the formula (XI) or (XIII), or if A is a radical of the formula (VIII).

2. A compound as claimed in claim 1, in which the following applies to B:  
 $m = 1$ .

3. A compound as claimed in claim 2, in which the following applies to B:  
 $m = 1$ ;  
 $x = 1$  to  $3$ ;  
 $z = 0$ .

4. A compound as claimed in claim 3, in which the following applies to B:  
 $m = 1$ ;  
 $x = 1$ ;



z = 0.

5. A compound as claimed in claim 1, in which the following applies to B:

5       m = 1;  
       x = 0;  
       y = 1;  
       z = 1 to 5.

- 10   6. A compound as claimed in claim 5, in which the following applies to B:

       m = 1;  
       x = 0;  
       y = 1;  
15       z = 1 to 3.

7. A compound as claimed in claim 1, in which the following applies to B:

       m = 1;  
20       x = 0;  
       y = 2 to 4;  
       z = 1.

- 25   8. A compound as claimed in claim 1, in which the following applies to B:

       m = 0;  
       x = 0;  
       y = 1;  
       z = 1 to 5.

- 30   9. A compound as claimed in claim 1, in which the following applies to B:

       m = 0;  
       x = 0;  
35       y = 2 to 4;  
       z = 1.

10. A compound as claimed in any of the preceding claims, in which the following applies to B:  
 $R_3 = CH_3$ .
- 5 11. A compound as claimed in any of claims 1 to 9, in which the following applies to B:  
 $R_3 = 1,2$ -dihydroxypropyl.
- 10 12. A compound as claimed in any of the preceding claims, in which the following applies to B:  
 $n = 2$  to 6.
- 15 13. A compound as claimed in any of the preceding claims, in which the following applies to B:  
 $n = 3$ .
- 20 14. A compound as claimed in any of the preceding claims, in which A is a radical of the formula (VIII) or (IX).
- 25 15. A compound as claimed in claim 14, in which A is a radical of the formula (VIII) and has 16 to 23 carbon atoms.
- 30 16. A compound as claimed in claim 14, in which A is a radical of the formula (IX) and has 19 to 26 carbon atoms.
- 35 17. A compound as claimed in claim 16, in which A is a radical of the formula (IX) and has 19 to 26 carbon atoms, and  $r = 0$ .
18. A compound as claimed in any of claims 1 to 13, in which A is a radical selected from one of the formulae (III) to (VII), and  $R_1$  and  $R_2$  are each independently a radical selected from one of the formulae (X) to (XIII).

19. A compound as claimed in claim 18, in which the following applies to B:  
 $x = 1$  and  $z = 0$ .
- 5 20. A compound as claimed in claim 18 or 19, in which A is a radical of the formula (III) or (IV), and  $R_1$  and  $R_2$  are each independently a radical selected from one of the formulae (X) to (XIII), where one of  $R_1$  and  $R_2$  has 16 to 32 carbon atoms and one of  
10  $R_1$  and  $R_2$  has 16 to 26 carbon atoms.
21. A compound as claimed in claim 18 or 19, in which A is a radical of the formula (III) or (IV), and  $R_1$  and  $R_2$  are both a radical selected from one of  
15 the formulae (X) to (XIII) and have 16 to 26 carbon atoms.
22. A compound as claimed in claim 18 or 19, in which A is a radical of the formula (III) or (IV), and  
20  $R_1$  and  $R_2$  are each independently a radical of the formulae (X) to (XIII) and have 16 to 24 carbon atoms.
23. A compound as claimed in any of claims 18 to 22,  
25 in which  $R_1$  and  $R_2$  are each independently a radical of the formula (X) or (XI).
24. A compound as claimed in any of claims 18 to 22,  
30 in which  $R_1$  and  $R_2$  are each independently a radical of the formula (XII) or (XIII).
25. A compound as claimed in claim 18, 19, 21 or 23,  
in which  $R_1$  and  $R_2$  are both a radical of the formula (XI).
- 35 26. A compound as claimed in claim 18, 19, 21 or 24,  
in which  $R_1$  and  $R_2$  are both a radical of the formula (XIII).

27. A compound as claimed in claim 18 or 19, in which  
A is a radical of the formula (III) or (IV), and  
one of R<sub>1</sub> and R<sub>2</sub> is an alkyl radical having 1 to 4  
carbon atoms.

5

28. A compound as claimed in claim 18 or 19, in which  
A is a radical selected from one of the formulae  
(III) or (IV), and one of R<sub>1</sub> and R<sub>2</sub> is a hydrogen  
radical.

10

29. Liposomes which comprise as liposome shell  
constituents phospholipids and/or alkylphospho-  
lipids, where appropriate cholesterol and 1 to  
50 mol% of a compound as claimed in any of claims  
1, 18 to 26 or salt thereof, where the  
cholesterol, the phospholipids, the alkylphospho-  
lipids and the compound together result in  
100 mol% of the liposome shell constituents.

15

20

30. Liposomes as claimed in claim 29, which  
additionally comprise an active ingredient, where  
appropriate together with pharmaceutically  
acceptable diluents, excipients, carriers and  
fillers.

25

31. Liposomes as claimed in claim 30, wherein the  
active ingredient is a compound as claimed in any  
of claims 1, 14 to 17 and 27 to 28.

30

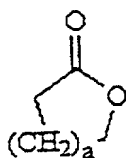
32. Liposomes as claimed in any of claims 29 to 31,  
which additionally comprise a nucleic acid.

35

33. A pharmaceutical composition, which comprises an  
active ingredient as claimed in any of claims 1,  
14 to 17 and 27 to 29, where appropriate together  
with pharmaceutically acceptable diluents,  
excipients, carriers and fillers.

34. A process for preparing unsaturated (Z)-fatty acids or (Z)-alkenols corresponding to a radical as set forth in any of the formulae (VIII), (IX), (X) and (XI) having 16 to 34 carbon atoms, supplemented by the missing H, which comprises using as starting material a lactone of the formula (XIV):

(XIV)



where  $a = 10$  to  $16$ ,

and which comprises the steps:

- 1) cleavage of the lactone ring with a trimethylsilyl halide to give the corresponding trimethylsilyl halo-carboxylate,
- 2) simultaneous or subsequent alcoholysis of the trimethylsilyl halo-carboxylate to give the corresponding halo-carboxylic ester,
- 3) reaction of the halo-carboxylic ester with triphenylphosphane to give the corresponding phosphonium salt,
- 4) reaction of the phosphonium salt with an aldehyde using a base and subsequent hydrolysis to give a corresponding (Z)-fatty acid salt,
- 5) liberation of the (Z)-fatty acid from the (Z)-fatty acid salt, and
- 6) where appropriate conversion of the (Z)-fatty acid into the corresponding (Z)-alkenol using lithium aluminum hydride.

35. The process as claimed in claim 34, wherein the (Z)-fatty acid is 15-(Z)-tetracosenoic acid, in which case cyclopentadecanolide is used as

starting lactone, and pelargonaldehyde is used as the aldehyde in step 4.

- 5 36. The use of a compound of the general formula (I) as claimed in any of claims 1 to 17, 27 and 28 as cytostatic active ingredient.
- 10 37. The use of a compound of the general formula (I) as claimed in any of claims 1 to 17, 27 and 28 as active ingredient against protozoal infections such as, for example, leishmaniasis and trypanosomiasis.
- 15 38. The use of a compound of the general formula (I) as claimed in any of claims 1 to 13 and 18 to 26 as liposome shell constituent.
- 20 39. The use of a compound of the general formula (I) as claimed in any of claims 1 to 13 and 22 to 26 as solubilizer for active ingredients insoluble in water.
- 25 40. The use of liposomes as claimed in claim 32 as gene transport vehicles.
- 30 41. The use of liposomes as claimed in claim 30 as antitumor compositions, where the active ingredient is doxorubicin.
42. The use of liposomes as claimed in claim 30 as compositions for influencing the proliferation of cells, where the active ingredient is a cytokine.

PTO/SB/01 (4-96)

Approved for use through 9/30/98 OMB 0651-0032

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# DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION

☐ Declaration Submitted with Initial Filing OR ☐ Declaration Submitted after Initial Filing

Attorney Docket Number HUBR 1177

First Named Inventor Eibl, et al

## COMPLETE IF KNOWN

Application Number

Filing Date

Group Art Unit

Examiner Name

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Phospholipids with unsaturated alkyl and acyl chains

(Title of the invention)

the specification of which

☐ is attached hereto  
OR

☒ was filed on (MM/DD/YYYY) August 06, 1999 as United States Application Number or PCT International

Application Number PCT/EP99/05710 and was amended on (MM/DD/YYYY) (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code §119 (a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365 (a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
198 35 611.0	Germany	Aug. 06, 98	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority sheet attached hereto.

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.

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Burden Hour Statement: This form is estimated to take 0.4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231.  
DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner of Patents and Trademarks, Washington, DC 20231.

(July 1996)

US.

Annex US.III. page 2

PCT Applicant's Guide - Volume II - National Chapter - US

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**DECLARATION — Utility or Design Patent Application**

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent  
NumberParent Filing Date  
(MM/DD/YYYY)Parent Patent Number  
(if applicable)
☐ Additional U.S. or PCT international application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

☐ Customer Number

24972

OR

☐ Registered practitioner(s) name/registration number listed below

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Number Bar Code  
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Name

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Registration  
Number
☐ Additional registered practitioner(s) named on supplemental Registered Practitioner Information sheet PTO/SB/02C attached hereto.

Direct all correspondence to: ☐ Customer Number  
or Bar Code Label

OR ☐ Correspondence address below

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))

Family Name or Surname

EIBL

Hansjörg

Inventor's  
Signature

Date

17.01.2001

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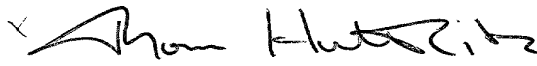
State

ZIP

Country

☐ Additional inventors are being named on the supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto



DECLARATION				ADDITIONAL INVENTOR(S) Supplemental Sheet			
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name	Thomas	Middle Initial		Family Name	HOTTKOWITZ	Suffix e.g. Jr.	
Inventor's Signature					Date	X 27.01.2001	
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Post Office Address	same as above						
City		State		Zip		Country	
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Given Name		Middle Initial		Family Name		Suffix e.g. Jr.	
Inventor's Signature					Date		
Residence: City		State		Country		Citizenship	
Post Office Address							
Post Office Address							
City		State		Zip		Country	
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name		Middle Initial		Family Name		Suffix e.g. Jr.	
Inventor's Signature					Date		
Residence: City		State		Country		Citizenship	
Post Office Address							
Post Office Address							
City		State		Zip		Country	
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name		Middle Initial		Family Name		Suffix e.g. Jr.	
Inventor's Signature					Date		
Residence: City		State		Country		Citizenship	
Post Office Address							
Post Office Address							
City		State		Zip		Country	
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name		Middle Initial		Family Name		Suffix e.g. Jr.	
Inventor's Signature					Date		
Residence: City		State		Country		Citizenship	
Post Office Address							
Post Office Address							
City		State		Zip		Country	

☐ Additional inventors are being named on supplemental sheet(s) attached hereto